State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Honolulu, Hawaii 96813

August 9, 2019

Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

REQUEST FOR APPROVAL TO ENTER INTO A MEMORANDUM OF AGREEMENT BETWEEN THE STATE OF HAWAII, BOARD OF LAND AND NATURAL RESOURCES AND THE STATE OF HAWAII, DEPARTMENT OF TRANSPORTATION REGARDING THE NEW KAPALAMA CONTAINER TERMINAL WHARF AND DREDGING, HONOLULU HARBOR, OAHU, HAWAII (JOB H.C. 10498) AND THE PROPOSED OFFSET MEASURE DESIGNED TO OFFSET THE LOSSES TO CORAL ON MAN-MADE SUBSTRATES

Submitted for your consideration and approval is a request to enter into a Memorandum of Agreement Between the State of Hawaii, Board of Land and Natural Resources (or "BLNR") and the State of Hawaii, Department of Transportation (or "DOT"), which oversees its Harbors Division, regarding the New Kapalama Container Terminal Wharf and Dredging, Honolulu Harbor, Oahu, Hawaii (Job H.C. 10498) and the proposed offset measure designed to offset the loss of live stony coral on man-made substrates that will occur as a result of the development.

Background

A large volume of goods and materials are imported to Hawaii via cargo vessels, which the people of Hawaii rely heavily upon. Honolulu Harbor is the primary commercial port of entry for overseas cargo vessels. The State of Hawaii anticipates a continued increasing demand for shipped goods and materials to Honolulu Harbor based on forecasted projections of Hawaii's future population growth and a steadily improving economic climate since the late 2000s recession. The rising demand for imported shipped goods and materials has led to an increase in container ship traffic in Honolulu Harbor, with a rising trend of larger ships carrying larger cargoes.

The existing management and distribution of imported cargo shipments from Honolulu Harbor to the outer islands requires moving and transporting by truck cargo containers from Piers 51-53 on Sand Island over the Sand Island Bridge to the interisland terminals at Piers 39-40 on the main side, prior to barging to neighboring islands. Because there is no alternative large containership dock space in Honolulu Harbor main side to receive and handle large overseas cargo vessels, the interisland distribution of shipped goods remains entirely dependent on existing overseas containership operations on Sand Island with transport over the Sand Island Bridge. As such, Hawaii's food and commodities security remains continually threatened by potential import shortages and risks associated with the vulnerability of the bridge to structural damage and/or attack.

Therefore, the proposed wharf and dredging project to improve and expand existing commercial harbor shipping operations and related facilities at Piers 40F through 45 is necessary to: 1) support anticipated increases in cargo imports due to forecasted increases in population and economic growth; and 2) provide safe, efficient, and alternative berths for large overseas vessels, interisland barges and related cargo container handling for existing and future commercial harbor operations.

DOT proposes to develop the Kapalama Container Terminal ("KCT"), through the demolishment and removal of existing shoreline facilities; the installation of 972 meters (3,190 feet) of sheet/king pile along the newly constructed shoreline; the removal of 319,740 cubic meters (417,900 cubic yards) of material to accommodate cargo vessels along the new docks; the enclosing and filling of Snug Harbor, the Rail Slip and Pier 40F to create 10,077 square meters (2.49 acres) of fast lands; the placement of 757 cubic meters (990 cubic yards) of rock at the west end of Pier 43 and adjacent to the Sand Island Bridge for shore protection; and the disposal of approximately 151,700 cubic meters (198,400 cubic yards) of dredged material to the South Oahu Offshore Dredged Material Disposal Site.

The Project is located at the Kapalama Basin in the western part of Honolulu Harbor, Oahu, Hawaii. The Project covers about 18.8 acres of upland and 8.13 acres of water within Kapalama Basin in the western portion of Honolulu Harbor, Oahu, Hawaii (Figure 1. Location Map, Page 8 of Board Submittal, Item F-1; also in Exhibit 2, Appendix 1, Page 6). The Project area extends from Pier 43 at the base of the Sand Island Bridge and Kalihi Channel through Snug Harbor, Pier 42, and to the foot of Piers 41 and 40F (Figure 2. Project Waters, Page 9 of Board Submittal, Item F-1; also in Exhibit 2, Appendix 1, Page 7). The shoreline will be transformed to create docks, a container wharf, and infrastructure capable of simultaneously loading, offloading, distributing and storing containerized cargo from two container ships and two interisland barges. This transformation will essentially straighten the existing shoreline resulting in the loss of 2.49 acres of waters of the U.S. by fill, and a gain of 2.78 acres of waters of the U.S. by excavation of existing fast land. The result is a slight gain (0.29 acres) of waters of the U.S. (Figure 2. Project Waters, Page 9 of Board Submittal, Item F-1; also in Exhibit 2, Appendix 1, Page 7). During the initial demolition phase of the Project, all fouling community and benthic community organisms (including corals) in the Project area that have not been transplanted away from the site will be lost. Corals intended for transplantation must be removed from the Project area prior to initiation of any in-water demolition work.

Demolition will include removal of piles, sheet piles, debris and other subsurface utilities. All existing artificial structures along the shoreline, including concrete piles, sheet pile bulkheads, in-water concrete debris, rail-slip hardware and foundations, wharf pavement and concrete foundations and subsurface utilities, will be physically removed from the existing 4,190-foot long shoreline. Approximately 417,900 cubic yards will be excavated and dredged within the Project area (Figure 2. Project Waters, Page 9 of Board Submittal, Item F-1; also in Exhibit 2, Appendix 1, Page 7).

The KCT development will result in the following short and long-term loss of natural hard substrate (live rock), fouling community (marine invertebrates) on natural hard substrate, and stony coral associated with these habitats:

1. Long term loss of 305 meters (1,000 feet) of shoreline and 5,710 square meters (m^2) (1.4 acres) of natural hard substrate;

2. Short term loss of 11,844 square meters (m^2) (2.9 acres) of fouling community on hard substrate;

3. Long-term loss of stony corals less than 40 cm diameter (<40 cm diameter; ≈ 25,468 colonies)

The KCT development will also result in the short and long-term loss of stony corals on man-made substrate within the project area, as indicated in the table below.

	1 – 5 cm	6 – 10 cm	11 – 20 cm	21 – 40 cm	41 – 80 cm	81 – 160 cm	+160 cm	Total #	Coral m^2
Cyphastrea ocellina	8	0	0	0	0	0	0	8	0
Leptastrea spp.	18,501	501	0	0	0	0	0	19,002	11
Pavona varians	23	15	8	0	8	0	0	53	2
Porites compressa	0	0	0	0	0	0	0	0	0
Porites lobata	4,451	1,455	410	96	33	12	0	6,457	46
Total Count	22,983	1,971	418	96	41	12	0	25,521	

Proposed Management Measures

The coral to be lost under the KCT Project are part of the unique aquatic ecosystems that the Department of Land and Natural Resources ("DLNR") Division of Aquatic Resources ("DAR") of the State of Hawaii is tasked with managing, conserving and restoring. The following offset measure project is designed to offset the total coral losses occurring on man-made substrate as listed above, and have been proposed and agreed upon between the DAR and DOT:

1) **The long-term loss of the 25,521 corals that are less than 40 cm in diameter** from the project area (on man-made substrates; i.e., corals that are on piles-artificial substrate).

   Offset measure project: DAR **Coral Nursery and Monitoring**: Coral colony production and out-planting at nexus sites to generate the replacement for the loss of corals and monitoring to document the results of this out-planting.

Note: The total amount of coral colonies on man-made substrates within the project area to be impacted by the KCT development is 25,521 colonies, which includes

53 colonies larger than 40 cm (longest diameter). All stony coral colonies greater than 40 cm diameter (>40cm) will be transplanted elsewhere within Honolulu Harbor[1] by DOT through a contractor as a minimization measure not included within this MOA. The loss of the remainder of the stony coral colonies which are less than 40 cm in diameter (<40cm) will be minimized or offset by the production, out-planting and monitoring of a select number of coral colonies that have been determined to be equal to the ecological services and function values of the coral colonies lost from the KCT Project area, through the use of the DAR Coral Tool used to calculate the Hawaiian Coral Ecological Characterization Value (ECV). This is described under the section entitled <u>Offset Measure 1 – Support for Coral Nursery Program to Minimize the Long-Term loss of Corals from Man-Made Structures Within the KCT Project Area</u>.

See the **Exhibit 2 – Appendix 1 (EFH Assessment)** at end of the board submittal for comprehensive details for the Kapalama Container Terminal Wharf and Dredging Project.

Below is a synopsis of the offset measure project which is designed to offset the total coral losses on man-made hard substrate, as listed above, and have been proposed and agreed upon between DAR and DOT:

A) <u>Offset Measure 1 – Support for Coral Nursery Program to Minimize the Long-Term loss of Corals Less than 40cm from Man-Made Structures Within the KCT Project Area</u>: As described in the EFHA, to minimize the long-term loss of 25,468 corals smaller than 40 centimeters in size from the KCT Project area, affixed to man-made substrates, due to the dredging and fill activities to be performed under the KCT Project, DOT shall provide financial support for the DLNR-DAR "Coral Restoration Nursery" at AFRC. Expansion of the existing Coral Restoration Nursery facilities at AFRC, collection of corals, coral husbandry to grow the collected corals to a suitable out-plant size, subsequent out-planting of the grown-out corals to appropriate new out-plant sites selected by DLNR-DAR, and select monitoring of the out-planted corals, will work to replace a select amount of coral colonies that have been determined to be equal to the ecological services and function values of the coral colonies lost from the KCT Project area, through the use of the DLNR-DAR Coral Tool used to calculate the Hawaiian Coral Ecological Characterization Value (ECV).

DAR will collect corals from the KCT Project site, as well as from donor sites, quarantine, grow, hold, and acclimate the collected corals at AFRC, and out-plant them at MLCDs, or other locations selected by DAR, as described in the DAR Coral Nursery

[1] The reason there is not an effort to transplant the coral colonies outside Honolulu Harbor is because of various biological advantages or disadvantages including the following: a) concerns about the risk of introduction or transportation of Aquatic Invasive Species (AIS) inside and outside the Harbor, b) the anticipated success rate of the transplantation effort, c) the amount of suitable habitat (including the biological capacity of the site) and the associated risk for future development at the site (i.e. potential future impact to transplanted coral colonies), d) the ecological value of larger corals and e) the long-term ecological benefit of the minimization or offset efforts to be implanted by DAR.

Plan, and the DAR Scope of Work (**Exhibit 2 – Appendix 2, Statement of Work**). On the basis that DAR is already growing 220 corals for DOT for the KCT Project for offsets for coral on natural substrates, and that on average, DAR can grow a forty-two cm coral colony module from ten cm of source coral tissue in about eight (8) months followed by a one month acclimation period, DAR will outplant the first coral colonies grown and out-planted specifically for Offset Measure 1, at the out-planting site(s) determined by DAR, no later than the December of 2021.

DAR will outplant up to sixty-nine (69) coral colonies (including eight (8) 80+ cm consolidated coral colony modules formed from thirty-two (32) coral colony modules) for Offset Measure 1 for the KCT Project (and up to twenty- five (25) additional coral colonies to replace source corals taken outside the KCT Project area), as apportioned by sizes and species indicated in the DAR Scope of Work, at the out-plant site(s) selected by DAR, over a period of one (1) year for Offset Measure 1, exclusive of the 36-month period after DAR's receipt of funding from DOT to support Offset Measure 1, and during which DAR will be growing and out-planting corals for DOT for Minimization Measure 2 under the existing DLNR-DOA MOA for KCT, Job H.C. 10498, signed December 2018.

DAR will conduct a baseline survey of the out-plant site prior to out-planting of coral at the site. DAR will monitor the out-planted corals, at the out-plant site(s) for a minimum of one (1) year after the last out-planting of corals is completed at the site, to monitor the progress of the out-planted corals and document changes in benthic habitat due to the out-planting of the new coral.

The number of coral colonies to be out-planted by DAR from its Coral Restoration Nursery under Offset Measure 1 will replace the lost ecological services and function values of the coral colonies atop man-made substrate from the KCT Project area. The total ecological services and function value is higher for the lower number of out-planted corals than the originally larger number of harbor coral colonies, due to replacement of a non-endemic species found in the harbor with the out-planted colonies of endemic species, the larger average size of out-planted colonies and the placement of out-planted coral colonies onto natural reef as opposed to artificial structure. DAR therefore has incorporated contingency planning into the calculations for the coral collection, husbandry, and out-planting efforts for Offset Measure 1.

DAR will be responsible for all efforts associated with coral husbandry, and out-planting to appropriate sites selected by DAR, including, but not limited to, harvesting corals from appropriate locations including but not limited to the KCT Project site, growing the harvested corals to a suitable size at AFRC, transporting and out-planting them to appropriate sites to be determined by DAR, monitoring and documentation of coral harvesting, growing and out-planting results, and obtaining any permits or approvals that DAR may need in order to conduct this work, all as described in the EFHA, the DAR Scope of Work, and the DAR Coral Nursery Plan.

Funding for Offset Measure 1. DOT will provide funding; in the amount of Eight Hundred Twenty-Seven Thousand and 00/100 DOLLARS ($827,000) for Offset Measure 1, in a series of payments[2] to DAR to support the Coral Restoration Nursery at AFRC as described in the DAR Coral Nursery Plan and clarified in the accompanying DAR Scope of Work.

DAR and DOT have prepared this Agreement regarding the minimization and offset measures that DOT will undertake, to provide information on the types minimizations or offset measures that will be funded, the funds to be allocated to each measure, the type of impact to aquatic resources the measures will be offsetting or minimizing, which department or division will be conducting the work, and the outcomes or deliverables expected from these measures.

As a state agency, DOT is considered exempt from the coral and live rock rules (§§ 13-95-70 and 13-95-71, Hawaii Administrative Rules (HAR)), as the term "person" is not explicitly defined, and therefore no authorization from DLNR-DAR is required for DOT for the take of coral and live rock. However, DOT will need to implement these minimization measures and offset measures, as a condition for issuance of the Department of the Army (DA) Permit, pursuant to consultations with applicable federal and state agencies and as anticipated conditions of the DA Permit. As an applicable state agency, DAR has conducted pre-consultations with DOT since November 2016, to provide best management policies to recommend appropriate minimization and offsets that work to lessen further impact to aquatic resources and/or restore habitat.

[2] Payment Schedule: $150,000 by end of August 2019 (or immediately after this Agreement is authorized); $50,000 by the end of May 2020; $50,000 by the end of May 2021; $480,000 by the end of May 2022; and $97,000 by the end of June 2023, or upon delivery of the final report for Offset Measure 1 to DOT and DOT's written acceptance of such report.

RECOMMENDATIONS:

That the Board:

1) Authorize and approve the request to enter into a Memorandum of Agreement Between the State of Hawaii, Board of Land and Natural Resources (or "BLNR") and the State of Hawaii, Department of Transportation (or "DOT"), which oversees its Harbors Division, regarding the New Kapalama Container Terminal Wharf and Dredging, Honolulu Harbor, Oahu, Hawaii (Job H.C. 10498) and the proposed offset measure designed to offset the loss of live stony coral on man-made substrates.

Respectfully submitted,

Brian J. Neilson, Acting Administrator
Division of Aquatic Resources

APPROVED FOR SUBMITTAL

Suzanne Case., Chairperson
Board of Land and Natural Resources

Attachments:

Exhibit 1 – Memorandum of Agreement Between the State of Hawaii Board of Land and Natural Resources, and the State of Hawaii Department of Transportation regarding Offset Measures for Coral Loss from Man-Made Structures Related to the New Kapalama Container Terminal Wharf and Dredging, Honolulu Harbor, Oahu, Hawaii, Job H.C. 10498

Exhibit 2 – Appendix 1 (EFH Assessment) with details for the Kapalama Container Terminal Wharf and Dredging Project Coral Transplantation Plan (from EFH Assessment) and **Appendix 2 (DAR Coral Restoration Nursery Kapalama Man-Made Substrate Coral Project Statement of Work)**.

Figure 1. Location Map (also in Exhibit 2, Appendix 1, Page 6)

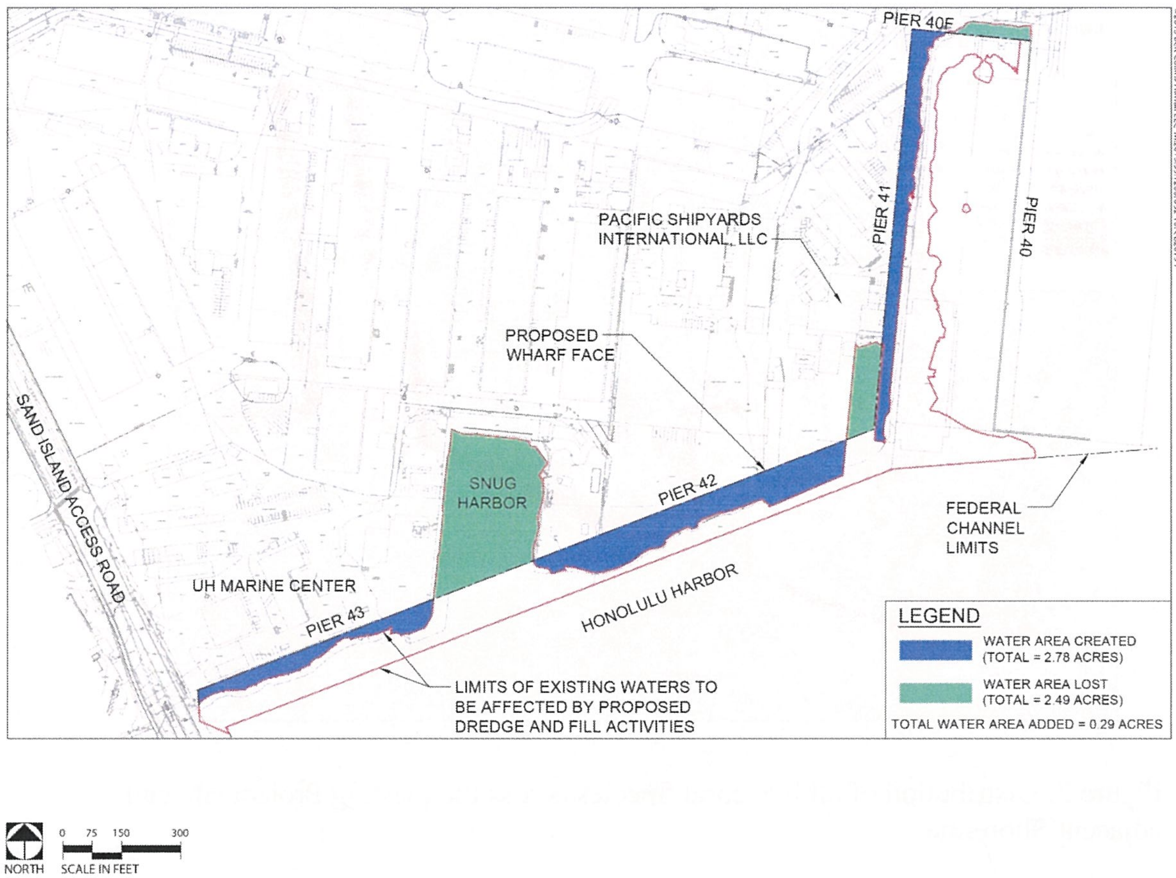

Figure 2. Project Waters (also in Exhibit 2, Appendix 1, Page 7)

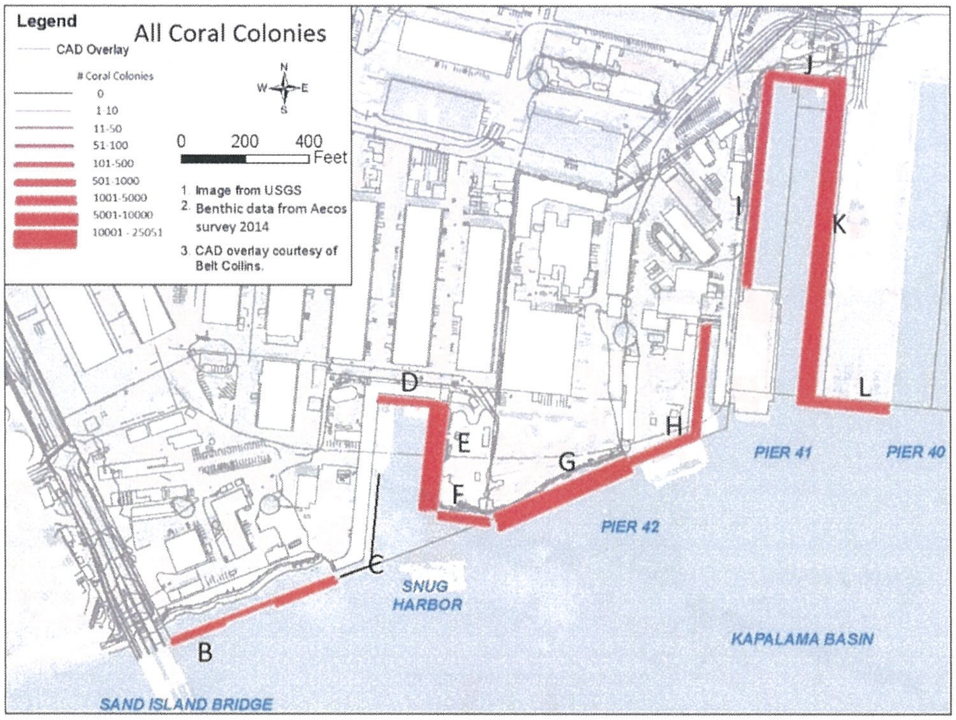

Figure 3. Distribution of all live coral Species across the existing Project site and adjacent Shoreline

Exhibit 1 (Item F-1)

MEMORANDUM OF AGREEMENT BETWEEN
THE STATE OF HAWAII BOARD OF LAND AND NATURAL RESOURCES,
AND THE STATE OF HAWAII DEPARTMENT OF TRANSPORTATION
REGARDING OFFSET MEASURES FOR CORAL LOSS FROM MAN-MADE STRUCTURES
RELATED TO THE NEW KAPALAMA CONTAINER TERMINAL WHARF AND DREDGING,
HONOLULU HARBOR, OAHU, HAWAII, JOB H.C. 10498

This Memorandum of Agreement ("Agreement") is effective this day of ____________ ("Effective Date"), by and between the State of Hawaii, Board of Land and Natural Resources (or "BLNR"), whose mailing address is 1151 Punchbowl Street, Room 130, Honolulu, Hawaii, 96813, and the State of Hawaii, Department of Transportation (or "DOT"), which oversees its Harbors Division (or "HAR"), whose mailing address is 79 South Nimitz Highway, Honolulu, Hawaii 96813 (BLNR and DOT sometimes hereafter collectively referred to as the "Parties"), regarding offset measures that DOT has undertaken to account for live stony coral loss expected to occur from in-water man-made structures related to work on the DOT's "The New Kapalama Container Terminal Wharf and Dredging, Honolulu Harbor, Oahu, Hawaii, Job H.C. 10498" project (or "KCT Project") and which project is to be located on and/or affect submerged lands and/or fast lands sometimes referred to by Tax Map Key Nos: (1) 1 – 2-025:009, 001, 012, 016, 017, 040, 042, 044, 046, 071, and 076 and (1) 1-5-032:002 and 43.

RECITALS

WHEREAS, DOT has management jurisdiction over Honolulu Harbor, as well as portions of the former Kapalama Military Reservation (or "KMR"), as provided under Chapter 266, Hawaii Revised Statutes, and by Executive Order No. 1458, dated July 23, 1951, Executive Order No. 3013, dated June 25, 1980, Executive Order No. 4006, dated September 11, 2003, and Executive Order No. 4206, dated November 6, 2007;

WHEREAS, Honolulu Harbor is the primary entry point for approximately 80% of cargo for the State of Hawaii (or the "State"), which already is at, or will imminently exceed, its capacity to safely handle cargo;

WHEREAS, DOT desires to develop the former KMR areas within its management jurisdictions into a new container terminal yard under the KCT Project to provide additional cargo handling capacity, located as shown on attached Exhibit 1;

WHEREAS, the KCT Project was identified in the Honolulu Waterfront Master Plan (1989) as DOT's highest priority project to meet the projected increase of cargo handling volume due to, and to support, forecasted population growth;

WHEREAS, the KCT Project proposes to demolish and remove existing shoreline facilities; install 972 meters (3,190 feet) of sheet/king pile along the newly constructed shoreline; remove 319,740 cubic meters (417,900 cubic yards) of material to accommodate cargo vessels along the new docks; enclose and fill Snug Harbor, the Rail Slip and Pier 40F to create 10,077 square meters (2.49 acres) of fast lands; place 757 cubic meters (900 cubic yards) of rock at the west end of Pier 43 and adjacent to the Sand Island Bridge for shore protection; and dispose of approximately 151,700 cubic meters (198,400 cubic yards) of dredged material to the South Oahu Offshore Dredged Material Disposal Site;

WHEREAS, the KCT Project is projected to result in the following short and long-term loss of both man-made and natural hard substrate habitat and coral and other organisms associated with these habitats:

A) Long term loss of 305 meters (1,000 feet) of shoreline and 5,710 sq. meters (1.4 acres) of natural hard substrate;

B) Short term loss of 11,844 sq. meters (2.9 acres) of fouling community on hard substrate; and

C) Long-term loss of live stony corals (25,468 colonies <40 cm, 53 colonies >40 cm);

WHEREAS, DOT agrees with the Department of Land and Natural Resources (or "DLNR") that the protected live coral occurring on man-made structures currently within the KCT Project area that are expected to be lost as a result of the KCT Project should be offset;

WHEREAS, DOT intends to issue an Invitation for Bids (or "IFB") to solicit construction bids for its KCT Project and upon receipt of bids execute a contract with the awarded construction contractor and subsequently issue a written Notice to Proceed (or "NTP") to proceed with construction of the KCT Project;

WHEREAS, DOT is agreeable to implementing limited minimization measures (or "Minimization Measures") as well as certain offset measures (or "Offsets"), as described in "The New Kapalama Container Terminal Wharf and Dredging Project (H.C. 10498) Essential Fish Habitat Assessment" revised March 2018 or "EFHA"), incorporated into this Agreement by reference and attached as Appendix 1, as the same may be amended, as a collaborative endeavor to insure adequate financial support to the overall KCT coral restoration program;

WHEREAS, DLNR is the agency of the State of Hawaii tasked with managing, conserving, and restoring the unique aquatic ecosystems of the State of Hawaii for present and future generations; and

WHEREAS, the corals to be lost under the KCT Project, and their associated aquatic habitat, are part of the unique aquatic ecosystems that DLNR is tasked with managing, conserving, and restoring; and

WHEREAS, the Parties agree that the Minimization Measures and Offsets as described herein to be implemented as conditions of the Department of the Army (or "DA") Permit to be issued for the KCT Project, satisfy the missions and objectives of each of the Parties.

NOW THEREFORE, in consideration of the mutual promises and representations contained herein, and good and valuable consideration, the receipt of which is hereby acknowledged, the Parties agree as follows:

A) Offset Measure 1 – Support for Coral Nursery Program to Minimize the Long-Term Loss of Corals from Man-Made Structures Within the KCT Project Area:

1) As described in the EFHA, to minimize the long-term loss of 25,521 corals affixed to man-made substrates in the KCT Project area, due to dredging and fill activities to be performed under the KCT Project, DOT shall provide funding, as and to the extent provided in this Agreement, for certain offset measures as described below in Paragraph A) 2) (hereafter collectively referred to as "Offset Measure 1") by the DLNR Division of Aquatic Resources (or "DAR") "Coral Restoration Nursery" at the Anuenue Fisheries Research Center (or "AFRC").

2) Offset Measure 1 funding will support the Coral Restoration Nursery, including expansion of the existing Coral Restoration Nursery facilities at AFRC, collection of corals, coral husbandry to grow collected corals to a suitable out-plant size, subsequent out-planting of the grown-out corals to the original donor site as well as to appropriate new out-plant sites selected by DAR, such as open substrate areas within Marine Life Conservation District (or "MLCD"), the Daniel K. Inouye International Airport Reef Runway reef (eastern end), and possibly other reef areas between the two channels fronting Honolulu Harbor and Sand Island, and monitoring of the out-planted corals, all as described in the DAR Scope of Work prepared by DAR and incorporated into this Agreement by reference and attached as Appendix 2 (or "DAR Scope of Work").

(a) DAR will proceed with the work described in the DAR Scope of Work, including expansion of the Coral Restoration Nursery, and harvesting of corals necessary for coral colony production at the AFRC for out-planting, within sixty (60) calendar days of DAR receipt of funding from DOT to support Offset 1.

(b) DAR will collect corals from the KCT Project site, as well as from appropriate donor sites (if necessary), quarantine, grow, hold, and acclimate the collected corals at AFRC, and out-plant them at MLCD, or other location selected by DAR, as described in the DAR Scope of Work, and summarized as follows:

- On the basis that DAR will take six (6) months for start-up, inclusive of expansion of the Coral Restoration Nursery at AFRC along with the collection of donor corals to grow, that DAR is already growing 220 corals for DOT for the KCT Project for offsets for coral on natural substrates, and that on average, DAR can grow a forty-two (42) centimeter coral colony (a suitable size for out-planting) from ten (10) centimeters of donor coral tissue in about eight (8) months followed by a one (1) month acclimation period, DAR will out-plant the first coral colonies grown and out-planted specifically for Offset Measure 1, at the out-planting site(s) determined by DAR, no later than the December of 2021.

- DAR will out-plant up to sixty-nine (69) coral colonies (including eight (8) 80+ cm consolidated corals from thirty-two (32) coral colony modules) for Offset Measure 1 for the KCT Project (and up to twenty-five (25) additional coral colonies to replace source corals taken outside the KCT Project area), as apportioned by sizes and species indicated in the DAR Scope of Work, at the out-plant site(s) selected by DAR, over a period of one (1) year for Offset Measure 1, exclusive of the 36-month period after DAR's receipt of funding from DOT to support Offset Measure 1, and during which DAR will be growing and out-planting corals for DOT for Minimization Measure 2 under the existing DLNR-DOT MOA for KCT, Job H.C. 10498, signed December 21, 2018.

(c) DAR will monitor the out-planted corals, at the out-plant site(s) described above, and prepare and submit reports summarizing the monitoring findings, as detailed in the DAR Scope of Work, and as follows:

- DAR will conduct a baseline survey of the out-plant site prior to out-planting of coral at the site.

- Monitoring of the out-planted corals, at the out-plant site(s), will be conducted by DAR for a minimum of one (1) year after the last out-planting of corals is completed at the site(s), to monitor the progress of the out-planted corals and document changes in benthic habitat due to the out-planting of the new coral colonies.

- DAR will prepare a single annual monitoring report, detailing the progress of the out-planted corals, as described in the DAR Scope of Work, with the report containing the findings of the baseline survey and monitoring surveys.

- DAR will transmit both a hard copy, as well as an electronic copy, of each monitoring report to DOT, no later than thirty (30) calendar days after the conclusion of the last monitoring survey conducted in the calendar year. The hard copies shall be printed in color and bound. The electronic copies shall be in PDF format.

3) The number of coral colonies to be out-planted by DAR from its Coral Restoration Nursery under Offset Measure 1 will replace the ecological services and function values of the coral colonies anticipated to be lost at the KCT Project area. The total ecological services and function values is higher for the lower number of out-planted corals than the originally larger number of harbor coral colonies found on man-made substrates within the KCT Project area, due to replacement of a non-endemic species found on man-made structures in the harbor with the out-planted coral colonies onto natural reef substrate. DAR therefore has incorporated contingency planning into the calculations for the coral collection, husbandry, and out-planting efforts for Offset Measure 1.

4) DAR will be responsible for all efforts associated with coral husbandry, and out-planting to appropriate sites selected by DAR, including, but not limited to, harvesting corals from appropriate locations including but not limited to the KCT Project site, growing the harvested corals to a suitable size at AFRC, transporting and out-planting them to appropriate sites to be determined by DAR, monitoring and documentation of coral harvesting, growing and out-planting results, and obtaining any permits or approvals that DAR may need in order to conduct this work, all as described in the DAR Scope of Work.

5) DAR will perform the restoration of coral colonies using coral colony out-planting (collecting, husbandry, growing and out-planting coral colonies), which will consist of one full attempt of the proposed work as described in the DAR Scope of Work. DAR will take efforts to avoid, but is not responsible for, any unforeseen variables that may interfere with the anticipated results or completion of the restoration effort, including (but not limited to) coral bleaching conditions or high sea-surface temperatures, natural disasters, storm effects, disease, predation, low fecundity, reproductivity during spawning or husbandry and low acclimatization rates to new environments.

B) <u>Funding for Offset Measure 1</u>. DOT will provide funding in the maximum amount of Eight Hundred Twenty-Seven Thousand and 00/100 DOLLARS ($827,000, which is the combined sum of the funding needed to support Offset Measure 1 (including collection of coral, quarantine, husbandry and grow-out, acclimatization, out-planting, monitoring, reporting, and administrative support) in annual payments, as shown below, to DAR to support the Coral Restoration Nursery at AFRC, as described in the budget included in DAR's Scope of Work.

1) Payment Schedule:

a. By end ofAugust 2019 (or immediately after this Agreement is authorized) -
   $150,000
b. By end of May 2020 - $50,000
c. By end of May 2021 - $50,000
d. By end of May 2022 - $480,000
e. By end of June 2023 - $97,000 (or upon delivery of final report for Offset Measure 1 to DOT and DOT's written approval of such report.)

2) DAR will ensure that they are able to receive the funding for Offset Measure 1.

3) DOT will transfer the 2019 funding to DAR to support the Coral Restoration Nursery at AFRC, for expansion of the Coral Restoration Nursery, collection of corals and subsequent quarantine, holding, and coral husbandry to maintain and grow the collected corals to suitable out-plant sizes, subsequent out-planting of the grown-out corals to the original donor as well as to appropriate new out-plant sites selected by DAR, and monitoring of the out-planted corals (as described by the DAR Scope of Work) by Journal Voucher or alternative mechanism agreeable to both Parties within sixty (60) calendar days after DOT has received confirmation that DAR is available to receive the funds, or within sixty (60) calendar days after the Effective Date of this Agreement, whichever is later; and thereafter to follow the payment schedule as set forth above.

4) Except as provided in Paragraph D) below, DAR will reserve the funds and use them solely for the costs specific to Offset Measure 1, which includes its Coral Restoration Nursery at AFRC as well as for project coral acquisition, out-planting and monitoring of corals from AFRC for the KCT Project.

5) The funding will support implementation of the work described in the DAR Scope of Work, which will result in the out-planting and monitoring of up to sixty-nine (69) coral colonies at out-plant site(s) selected by DAR all as described in Paragraph A.2.b.ii. above.

6) The funding detailed above for Offset Measure 1 will constitute full compensation and satisfaction in full of DOT's obligations towards DAR labor and manpower, supervision, overhead expenses, materials, equipment, insurance, taxes and all other direct and indirect costs associated with coral husbandry, out-planting, monitoring, reporting and maintenance including all necessary permits and approvals, as described under Paragraph A above.

C) Should DOT elect to cancel, or indefinitely defer, the KCT Project, for whatever reason, and/or if approval of the DA Permit is denied, DOT may terminate this Agreement, by written notice to DLNR, without penalty, charge, or other liability.

D) DAR may utilize the funding provided for Offset Measure 1 as outlined in this Agreement interchangeably between the proposed restoration projects and interchangeably between budgeted or unbudgeted items, as necessary to fulfill its deliverables of the proposed restoration projects; provided, however, that any such interchange by DAR shall in no event result in any increase of DOT's obligation for any funding for Offset Measure 1 or impose upon DOT obligation for any funding for any other restoration projects unless specifically agreed to in writing by DOT.

E) Should either party materially breach this Agreement and fail to cure such breach within sixty (60) days of written notice thereof, the non-breaching party may terminate this Agreement by written notice to the breaching party.

F) This Agreement shall be governed and construed in accordance with the laws of the State of Hawaii.

G) No third-party beneficiaries are intended by this Agreement, and the terms and provisions of this Agreement shall not give rise to any right in third parties to enforce the provisions of this Agreement.

H) Notwithstanding any provision to the contrary, DAR shall not be responsible for non-compliance of any provision in this Agreement due to factors outside of its control, including (but not limited to) coral bleaching conditions or high sea-surface temperatures, natural disasters, storm effects, disease, predation, low fecundity, reproductivity during spawning or husbandry and low acclimatization rates to new environments, or any changes to the KCT Project; provided, however, that in no event shall any such noncompliance (or suboptimal performance or outcome) due to such factors result in DOT being obligated for any additional offset measures or funding other than as set forth for Offset Measure 1 in this Agreement.

I) This Agreement constitutes the entire agreement of the parties with respect to the matters set forth in this Agreement, and, except as specifically provided otherwise herein, there are no agreements, understandings, warranties, or representations between the parties except as set forth herein.

J) This Agreement cannot be amended or modified except by an instrument, in writing, signed by each of the parties.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the Effective Date.

Exhibit 1

APPROVED AS TO FORM

____
DEPUTY ATTORNEY GENERAL

STATE OF HAWAII
Department of Transportation

____
JADE T. BUTAY
Director
Department of Transportation

DOT

APPROVED AS TO FORM

____
DEPUTY ATTORNEY GENERAL

STATE OF HAWAII
Board of Land and Natural Resources

____
SUZANNE D. CASE
Chairperson
Board of Land and Natural Resources

BLNR

Approved by State of Hawaii,
Board of Land and Natural Resources,
at Its Meeting Held on______, 201 ,
(Item_____)

Exhibit 1

New Kapalama Container Terminal
Wharf and Dredging Project

Project Area Boundaries. Landward limit of The Project labelled, "Wharf and Dredging Project Limit (blue dashed line). Seaward limit of the Project demarcated in orange.

EXHIBIT 1

APPENDIX 1

THE NEW KAPALAMA CONTAINER TERMINAL WHARF AND DREDGING PROJECT

(H.C. 10498)

Essential Fish Habitat Assessment

THE NEW KAPALAMA CONTAINER TERMINAL WHARF AND DREDGING PROJECT

(H.C. 10498)

Essential Fish Habitat Assessment

State of Hawaii, Department of Transportation

Harbors Division

Honolulu Harbor, O‘ahu, Hawai‘i

DEPARTMENT OF THE ARMY FILE NO. POH-2012-00081

Prepared for:
NOAA, National Marine Fisheries Service
Protected Resources Division and Habitat Conservation Division
Pacific Islands Regional Office
Honolulu, Hawai'i

Prepared by:
U.S. Army Corps of Engineers, Honolulu District
Regulatory Office

And

State of Hawaii, Department of Transportation
Harbors Division

March, 2016

(Revised March 2018)

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1.1 PURPOSE & BACKGROUND

1.2 AUTHORITY

Pursuant to the U.S. Army Corps of Engineers' (Corps) authorities to issue a Department of the Army (DA) permit under Section 10 of the Rivers and Harbors Act of 1899 (Section 10; 33 U.S.C 403), Section 404 of the Clean Water Act (Section 404; 33 U.S.C. 1344), and Section 103 of the Marine Protection, Research and Sanctuaries Act, as amended (Section 103; 33 U.S.C. 1413), the Corps is evaluating the environmental effects of the State of Hawaiʻi Department of Transportation, Harbors Division's (DOT-Harbors; Applicant), proposed improvement and expansion of existing harbor facilities located at Piers 40F through 45 within the Honolulu Harbor to support the New Kapalama Container Terminal Wharf and Dredging Project, Honolulu, Island of Oʻahu, Hawaiʻi. Tax map key (TMK) numbers for the project site includes 1-2-025:009, 011, 012, 016, 017, 040, 046, 071, 076, and 1-5-032:002 and 043.

This document constitutes the Corps' Essential Fish Habitat (EFH) Assessment which evaluates the direct, indirect, and cumulative effects of the proposed action on EFH as defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and in support of consultation with the National Oceanic and Atmospheric Administration – National Marine Fisheries Service (NMFS) under Section 305(b)(2) MSA for adverse impacts to EFH.

1.3 PROJECT BACKGROUND (PURPOSE AND NEED FOR THE PROPOSED ACTION)

The main Hawaiian Islands are geographically isolated from the contiguous U.S. and have limited natural resources and industries. As such, a great deal of goods and materials are imported to Hawaii via cargo vessels, which the people of Hawaii rely heavily upon. Honolulu Harbor is the primary commercial port of entry for overseas cargo vessels. The State of Hawaii anticipates a continued increasing demand for shipped goods and materials to Honolulu Harbor based on forecasted projections of Hawaii's future population growth and a steadily improving economic climate since the late 2000s recession. The rising demand for imported shipped goods and materials has led to an increase in container ship traffic in Honolulu Harbor, with a rising trend of larger ships carrying larger cargoes. Similarly, interisland barge companies are responding in kind by placing larger barges into service to accommodate distribution of larger cargo shipments to the outer islands at higher frequency. During the past decade interisland barge calls in Honolulu Harbor have increased and currently vary from 13.2 to 18.5 visits per week.

The existing management and distribution of imported cargo shipments from Honolulu Harbor to the outer islands requires moving and transporting by truck cargo containers from Piers 51-53 on Sand Island over the Sand Island Bridge to the interisland terminals at Piers 39-40 on the main side, prior to barging to neighboring islands. Because there is no alternative large containership dock space in Honolulu Harbor main side to receive and handle large overseas cargo vessels, the interisland distribution of shipped goods remains entirely dependent on existing overseas containership operations on Sand Island with transport over the Sand Island Bridge. As such, Hawaii's food and commodities security remains continually threatened by potential import shortages and risks associated with the vulnerability of the bridge to structural damage and/or attack.

Therefore, the proposed wharf and dredging project to improve and expand existing commercial harbor shipping operations and related facilities at Piers 40F through 45 is necessary to: 1) support anticipated increases in cargo imports due to forecasted increases in population and economic growth; and 2) provide safe, efficient, and alternative berths for large overseas vessels, interisland barges and related cargo container handling for existing and future commercial harbor operations.

2.1 DESCRIPTION OF PROPOSED ACTION & "PROJECT AREA"

The New Kapalama Container Terminal Wharf and Dredging Project ("The Project") is a component of the DOT-Harbor's greater Kapalama Container Terminal (KCT) project. The KCT project complies with and supports the State's long-range development plan for the harbor, *"O'ahu Commercial Harbors 2020 Master Plan"* (1997), which includes the wharf and dredging improvements at Piers 40F through 45, development of a new container yard, and other related improvement projects to support tenant relocations at various locations within the harbor.

The scope of the Project is comprised of new wharf construction and dredging within the area water ward of the Wharf and Dredging Project Limit boundary shown on Figures 1 and 2, and consists of approximately 18.8 acres of fast land and 8.13 acres of waters of the U.S. (total area: 26.93 acres). The proposed activities associated with the Project that require a DA permit, are within the Corps' federal control and responsibility to consider, and that constitute the Federal action are described below in Section 2.2 Proposed Action, and in construction details provided in Section 2.3 and accompanying design plans.

2.2 "PROJECT AREA" DEFINED

The scope of the Corps' "Project area" for the purposes of EFH consultation under Section 305(b)(2) of the MSA consists of the in-water work areas within the Wharf and Dredging Project Limit boundary depicted on Figure 2. The total area of EFH waters and substrate (waters of the U.S.) within the defined project area boundary is 8.13 acres (See also Section 3.3 Essential Fish Habitat).

Figure 1 Project Area Boundaries. Landward limit of The Project labelled, "Wharf and Dredging Project Limit (blue dashed line). Seaward limit of the Project demarcated in orange.

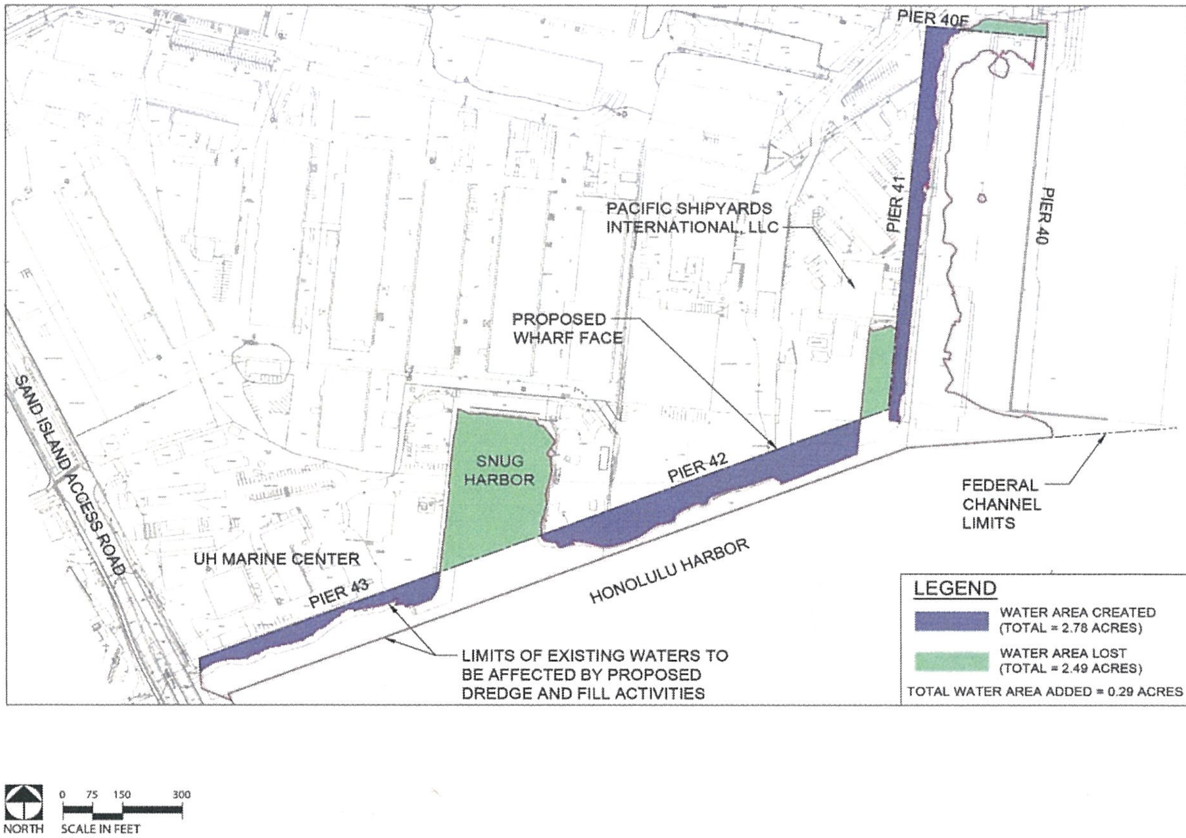

Figure 2. Existing and Proposed New Shoreline and Makai Boundary of Project Area. Green areas will be filled, blue areas will be excavated. The Project Area includes all in-water work areas and is bounded by the solid red line and dashed black line.

2.2 PROPOSED ACTION

The proposed improvements include constructing two docks for overseas container ships and two docks for interisland barges along a common wharf with modern infrastructure for container loading, offloading, storage, and transshipment. Specifically, the following proposed activities require a DA permit to achieve the project purpose:

- A total of 972 m (3,190 ft) of sheet/king pile installed in uplands and waters of the U.S. to armor the shoreline and construct the new bulkhead for the wharf. (Section 10)
- Dredging in waters of the U.S. and excavation in uplands to remove a total of 319,740 cu. m. (417,900 cu. yd.) of material. The total dredging and excavation area is 8.42 acres, which consists of 11,250 sq. m. (2.78 acres) of fast land and 22,832 sq. m. (5.64 acres) of soft benthic substrate in waters of the U.S. (Section 10)

- Permanent discharge of dredged and fill material into 10,077 sq. m. (2.49) acres of waters of the U.S. to fill in the enclosed Snug Harbor, Rail Slip and Pier 40F. (Section 404)
- A total of 757 cubic meters (cu. m.) (990 cubic yards [cu. yd.]) of rock permanently discharged in shallow water over 409 sq. m. (4,400 sq. ft) of waters of the U.S. at the west end of Pier 43 near the northern abutment of the Sand Island Bridge for scour protection. (Section 404)
- A total of 151,700 cu. m. (198,400 cu. yd.) of dredged material would be transported for ocean disposal at the South Oahu Offshore Dredged Material Disposal Site (SOODMDS). The remainder of the dredged/excavated material would be disposed of in uplands. Gross dredge and fill estimates are shown in Table 1. (Section 103) New utility lines, including water lines beneath the harbor channel, other appurtenant structures (e.g. bollards, ladders, fenders, etc.), and temporary Best Management Practice (BMP) measures would also be installed in, over or under navigable waters to complete the Project. (Section 10)

A total of 8.13 acres of waters of the U.S. would be directly and permanently impacted by new wharf construction activities, including permanently filling 10,077 sq. m. (2.49 acres) of waters of the U.S. to construct new wharf structures (Figure 2). It is presumed that marine waters immediately adjacent to the in-water work area would be indirectly affected by in-water construction activity. To minimize total area of waters of the U.S. filled and converted to uplands to construct the docks, DOT- Harbors has proposed the excavation of uplands to create and expand the area of waters of the U.S. by 11,254 sq. m. (2.78 acres) as shown in Figure 2. Overall, the Project would yield a total net gain of 1,174 sq. m. (0.29 acre) of waters of the U.S. No loss of coral reefs, vegetated shallows, or other special aquatic sites, as defined at 40 CFR 230, Subpart E, would result from the Project.

2.3 CONSTRUCTION PHASES OF THE PROPOSED ACTION

The proposed action is divided into the following eight (8) general construction phases:

1. Waterline Installation beneath Kalihi Channel
2. Demolition of Existing Shoreline Facilities
3. Shoreline Bulkhead Construction and Sand Island Bridge Scour Protection
4. Enclosing and Filling Snug Harbor, the Rail Slip, and Pier 40F
5. Shoreline Excavation
6. Harbor Dredging
7. Dredged Spoils Disposal
8. Wharf Infrastructure and Surface Facilities Construction

Construction is planned to begin in 2018 and would require 36 months to complete the overlapping construction phases. A summary of the activities requiring a DA permit in or affecting waters of the U.S., which comprise each construction phase is described in the following subsections, with additional construction details provided in a partial set of plans at Appendix A. DOT-Harbors has identified appropriate and necessary BMP measures that are considered part of the proposed action. These measures are detailed in Section 2.4, below.

2.3.1 Waterline Installation beneath Kalihi Channel

Two (2) new, 12 to 16-inch diameter High Density Polyethylene (HDPE) water lines would be installed approximately 50 to 70 feet beneath the Kalihi Channel bottom using entry and exit pits located in uplands of both the Project area and Sand Island via Horizontal Directional Drilling (HDD). The new water lines would replace existing 12-inch and 16-inch diameter water lines owned by the Honolulu Board of Water Supply, currently proposed for abandonment in place. The locations of the drill entry and exit pits would be sited in uplands, several hundred feet from waters of the U.S. Return flows of drilling effluent are not proposed. Drill pits would be appropriately sized to prevent overflow and contain all effluent generated by the upland drilling activity.

2.3.2 Demolition of Existing Shoreline Facilities

All existing man-made structures occurring in waters of the U.S. along the shoreline, including 452 concrete piles, sheet-pile bulkheads, in-water concrete debris, rail-slip hardware and foundations, wharf pavement and other deleterious concrete structures would be completely removed from the existing 1,277-m (4,190-ft.) long shoreline. All demolition waste generated on-site would be disposed of at an approved upland facility or reused as on-site fill, where appropriate.

2.3.3 Shoreline Bulkhead Construction and Sand Island Bridge Scour Protection

A king pile and sheet pile wall with a total length of 972 m (3,190 ft) would be driven into the substrate by impact and/or vibratory hammer from the west end of Pier 43 to the junction of Piers 42 and 41 and along the new face of Pier 41 to its junction with Pier 40. Most of the wall would be installed within uplands well inland of the existing shoreline. In-water pile installation would occur across the mouth of Snug Harbor and the Rail Slip and along Pier 40F. To protect against scouring, the west end of Pier 43 near the Sand Island Bridge would be lined with a 409 sq. m. revetment constructed of a three-foot layer of quarry rock overlain by a 5-ft thick layer of armor stone.

2.3.4 Enclosing and Filling Snug Harbor, the Rail Slip, and Pier 40F

Initially, Snug Harbor would be partially filled with dredged material by direct deposition from hopper barges prior to the installation of the sheet/king pile wall across the harbor mouth. The balance of the fill to Snug Harbor, the Rail Slip and Pier 40F would be dredged spoils and excavated materials placed within the pile walls. Additional dredged material would be added as surcharge to the top of the fill areas to compress the fill. The total area of waters of the U.S. that would be filled and permanently converted to uplands is 2.49 acres.

2.3.5 Shoreline Excavation

A 2.78-acre area of existing fast land would be excavated from the existing shoreline at Piers 41, 42 and 43 back to the new wharf face. The excavation activities would result in the permanent conversion of 2.78 acres of uplands to waters of the U.S., and result in a net gain of 0.29 acre of waters of the U.S. (Figure 2).

2.3.6 Harbor Dredging

Material that cannot be excavated from the shoreline would be dredged from the harbor using barge-mounted equipment to achieve the design depths of -30 and -40 ft MLLW, plus two-foot over-dredge. Dredging would be achieved using mechanical means, specifically, a clamshell dredge with an "environmental bucket" (fitted with a lid) to minimize inadvertent discharges into the water column. Neither cutter-head nor suction dredge is proposed. The total excavated and dredged quantity is estimated to be 319,740 cu. m. (417,900 cu. yd.) of uplands and in-water sediments.

2.3.7 Offshore or Upland Disposal of Excess Dredged Spoils

Dredged material that is not reused on-site for construction fill would be disposed of at an approved upland disposal facility or at the SOODMDS. The United States Environmental Protection Agency (USEPA) has issued a suitability determination and conditional concurrence dated July 14, 2015, and correction to this determination and concurrence dated August 13, 2015, approving DOT- Harbors' proposed disposal of dredged material at SOODMDS. The conditions prescribed by USEPA shall become required special conditions of the DA permit, if issued. The total amount of dredged material conditionally approved for disposal at SOODMDS is 198,400 cu. yd.

2.3.8 Wharf Infrastructure and Surface Facilities Construction

Under the greater KCT project, the new wharf would be topped with a 21-inch thick reinforced concrete deck and infrastructure capable of supporting the cranes and other equipment necessary to operate a modern container terminal. The wharf infrastructure would also include on-site drainage facilities equipped with storm water treatment systems designed to treat storm water runoff from the new wharf. To clarify, these activities occurring in uplands are not within the Corps' authority to regulate and are therefore beyond the Corps' federal control and responsibility.

Table 1. Gross Dredge and Fill Estimates for Project

Location	Removal (+) or Fill/Disposal (-) Volume (cubic yards)	Area (acres)
Material to be removed from the site, including dredge material and fast land excavation material	+417,900	8.42
SOODMDS, ocean disposal site	-198,400	Pending results of pre-disposal survey of SOODMDS
Fill in Snug Harbor	-124,200	2.00
Snug Harbor Closure Dike*	- 6,450*	0.50*
Fill in Rail Slip	-13,300	0.35
Fill at Pier 40F	-4,150	0.14
Pier 43 Slope Protection**	- 990**	0.10**
On-site grading/fill material or material to be disposed of at an approved upland facility	-68,460	

*The entire volume of closure dike would be inside the sheet/king piles and is part of the 2.0 acres to be filled within Snug Harbor, therefore the 6,450 cu yd quantity does not add toward permanent fill quantity.
**Slope protection armor stone is from quarry, not from dredged material.

2.4 THE APPLICANT'S PROPOSED AVOIDANCE AND MINIMIZATION MEASURES INCLUDED AS PART OF THE PROPOSED ACTION

DOT-Harbors has formulated a Site-Specific BMP Plan identifying all measures that would be implemented before, during and after construction to avoid and/or minimize project-related impacts to the natural and human environment. The following BMPs, as excerpted from the Project BMP Plans, are considered a part of the applicant's proposed action and would be implemented, as applicable, to avoid and/or minimize adverse impacts, specifically to EFH. Rationale for implementation of each BMP as it relates to EFH is also provided below.

- Prior to initiating any in-water construction or demolition work, coral colonies meeting transplant specifications outlined in the Project's coral transplantation plan, *"The New Kapalama Container Terminal Wharf and Dredging Project, Coral Transplantation Plan"*, revised July 2017 (Appendix C), would be transplanted to an accepted recipient site (i.e., Piers 5-6).

  - *Rationale: to minimize direct and avoid indirect impacts to coral colonies.*

- Coral transplantation activities shall be timed to occur outside of peak lobe coral spawning season and preceding (1-month prior) expected reproduction timeframes (July through August).
  - *Rationale: The most prevalent coral species found within the harbor, Lobe coral (Porites lobata), spawns from July to August two to three days after the full moon. For corals, the production of gametes is a physically demanding process causing natural stress for corals during spawning season. Avoiding coral transplantation activities the month preceding and during the spawning season would reduce additional Project-related stressors to spawning corals and reproduction efficacy.*

- Provide financial support for the coral reef hatchery program at the State of Hawai'i DLNR-DAR AFRC. The amount of funding necessary to minimize the loss would be determined in coordination with DLNR-DAR.
  - *Rationale: to minimize long-term loss of 171 sq m of smaller (<40 cm) corals that provide habitat that supports MUS in the habor.*

- Restrict turbidity-generating construction activities and remove sediment containment BMPs overnight during specific coral reproduction timeframes (e.g. two to three days, or five days to be conservative, after the full moon in July and August).
  - *Rationale: The majority of larvae are released at night and elevated turbidity has the potential to adversely affect coral spawning activities. Removal of in-water sediment containment BMPs overnight would avoid disruption or restriction of night coral spawning during reproductive months.*

- The use of full length, full-surround silt curtains shall be installed during in-water construction activities (i.e. dredging, shoreline excavation, pile driving, demolition of in-water structures, filling of Snug Harbor, etc.) to isolate and contain construction-generated turbidity, where and when such installation is effective and appropriate.
  - *Rationale: to minimize indirect impacts that have the potential to degrade water quality of surrounding harbor waters and to prevent settling of suspended sediments atop adjacent habitats for coral, macro-invertebrate, and fish communities. Silt curtains are ineffective when deployed in currents, therefore any in-water construction activities dependent upon their use, would be curtailed during significant storm events when flows*

from streams entering the harbor generate surface currents. The BMP plan provides a description of conditions for when silt curtain BMPs are not likely to be effective and accordingly would not be implemented.

- Oil absorbent booms shall be readily available during excavation of the upland shoreline.
  - *Rationale: to protect against potential release of land-based pollutants into the soil at the groundwater interface that could infiltrate harbor waters.*

- Designated areas for dewatering of dredge spoils would be designed and managed to ensure containment of stockpiles and dredged effluent and prevent surface return flow or overflow into harbor waters or other waters of the U.S.
  - *Rationale: to avoid degradation of harbor water quality resulting from return flow or overflow of dredged spoils.*

- An environmental observer would be on-site daily to monitor all in-water work.
  - *Rationale: this BMP is intended to cover a broad range of potential resource concerns from sea turtle and marine mammal observations to documentation of any turbidity plumes or other construction practices that may result in adverse impacts to the harbor environment. The observer would play an active role in addressing and resolving environmental concerns and ensuring corrective measures are implemented in a timely manner.*

- Turbidity-generating, in-water construction activities would be halted during periods of heavy precipitation that have the potential to elevate ambient turbidity levels within the harbor.
  - *Rationale: this BMP is intended to avoid compounding construction-generated turbidity levels atop stormwater-related turbidity within the harbor to minimize adverse impacts to EFH.*

3.1 ENVIRONMENTAL BASELINE CONDITIONS WITHIN THE "PROJECT AREA"

As described in Section 2.1, the "Project area" is defined as the in-water work areas within the dredge and fill footprint as shown on Figure 2. The Project area is a component of the greater KCT "Project site", which includes, in addition to the Project Area, the adjacent shoreline and uplands that will be impacted to facilitate construction of the KCT Project.

3.2 PROJECT SITE EXISTING ENVIRONMENT

The KCT Project site is located in Hawai'i on the Island of O'ahu at the western extent of Honolulu Harbor at the base of the Kalihi-Nuuanu Watershed. The project site occupies 13 parcels of uplands within TMKs 1-2-025, 1-5-032, and 1-5-041 adjacent to the Sand Island Bridge and the Kalihi Channel, and includes the fronting harbor waters. The land is completely urbanized and classified for industrial and commercial land use, with harbor waters restricted to commercial or other use by State-authorized tenants/users.

Over the past century, Honolulu Harbor has undergone dramatic physical changes with gradual development and modifications of the harbor shoreline resulting in the construction of Sand Island on barrier reef islets, and the dredging of the Kalihi Channel and adjacent Keehi Lagoon channels to support both ship traffic and landing seaplanes. Much of the historic coastal wetlands that surrounded the harbor were filled to construct docks and wharves. The estuarine fishponds at the northwest end of Honolulu Harbor were filled to build docks and to construct the former Kapalama Military Reservation that was subsequently returned to the State of Hawaii and leased to various harbor users including the University of Hawaii's Marine Center at Snug Harbor, Pacific Shipyards International, Young Brothers, Atlantis Submarines, Pasha Group, Honolulu Fueling Facilities Corp and Sea-Land Service.

Because of the former development and use of the site, there are no natural or landscaped areas within uplands in the KCT Project site. The existing dry land portions of the Project site and other upland areas identified for construction of the proposed container yard were formerly contained warehouses that supported a wide variety of businesses. Except for a few remaining tenant businesses, most have moved or are in the process of relocating to other piers within the harbor as a result of the KCT Project. Within the project site, only a few buildings and remnant structural features remain that would be removed and improved upon as part of the proposed action.

Water depths in the immediate vicinity of the KCT Project site range from approximately 13 feet below mean lower low water (MLLW) at the waterfront edge to approximately 43 feet below MLLW at the middle of the channel. Water depths within Snug Harbor are in the range of 25 to 31 feet below MLLW (USACE HD 2011).

Honolulu Harbor receives surface runoff via sheet flow and drainage outlets and drainage from Kapalama Canal and Nuuanu Stream which have the potential to convey terrigenous sediments into Honolulu Harbor during precipitation events. During storm events, storm runoff can result in temporary increases in nutrients, pollutants, and sediments in the harbor in addition to a decrease in water clarity. Harbor sediments are continually resuspended into the water column due to large vessel activity such as ship and tug boat movements i.e. propeller wash within the harbor. Such inputs contribute to the ambient water quality of Honolulu Harbor.

Based on water quality data from 2002 and 2004,the State of Hawaii Department of Health (DOH) designated Honolulu Harbor a Water Quality Limited Segment (WQLS) for exceeding state water quality criteria for nitrate+nitrite, ammonia, total nitrogen, total phosphorus, turbidity, trash, and chlorophyll α. A survey of water quality in the harbor was conducted for 23 stations on April 6, 2012, (MRC, 2012) during mild weather conditions; i.e., no major storm runoff from Kapalama or Nuuanu Streams. The 2012 survey indicated that Honolulu Harbor water met basic water quality criteria at the majority of the stations at the time of this sampling, with the exception of ammonia.

The State DOH Water Quality and Assessment Report (HDOH, 2014) lists Honolulu Harbor as having insufficient data to conclude whether water quality standards are currently being met. However, it does list the ammonia standard as not met in the Aloha Tower Waterfront area of the harbor. Additionally, the State turbidity criterion is also not met from near shore waters to 30-foot depth, from one mile northwest of Honolulu Harbor/Sand Island Channel to Waikiki Beach. Accordingly, the ambient water quality is constantly impacted by landside drainage into and vessel movement within the harbor that adversely affect the chemical characteristics of its waters.

3.3 PROJECT AREA EXISTING ENVIRONMENT

Two benthic habitat types are recognized in the Wharf and Dredging Project area of Honolulu Harbor: the soft bottom substrate of the harbor floor and the hard substrate along the shoreline perimeter. Surveyed hard substrate habitat includes both man-made and naturally occurring substrate that has been substantially modified by man over the past century to construct the operational harbor. The water column in Honolulu Harbor is stratified and provides a variety of micro-habitats defined by light, salinity, nutrient availability and plankton concentrations.

3.3.1 Soft Substrate Habitat

The soft substrate community makes up over 90% of the benthos of the aquatic area that may be impacted by the Project. The Project area was surveyed (*AECOS*, 2014), and found to consist primarily of dark, very soft silt and fine sand with no evidence of any surface dwelling macro-invertebrates, macro-algae, or seagrass beds. With the exception of numerous small (typically <1 cm) burrow holes, the bottom lacks visible structural features. However, it is known that soft sediment habitats, in general, support a diverse community likely consisting primarily of polychaetes, crustaceans, mollusks, and burrow-dwelling fish just below the mud surface. Species adapted to this habitat structurally alter the habitat through bioturbation, burrow and tube building. These activities result in increased water flow and nutrient cycling through the surface layers of mud. Soft bottom habitats can perform ecological functions in marine communities, by recycling organic matter up into the food web. Many of the organisms that live in this habitat are adapted to filter feed, increasing the extraction of material from the overlaying water column. Benthic burrowing communities are typically highly resistant to adverse impacts from sedimentation and have a high rate of reproduction and community recovery but would be very susceptible to the wholesale removal of the habitat (i.e. dredging).

The abundance of mobile invertebrate feeding fish noted in the fish survey are at least partially dependent upon these bottom dwelling organisms for their food supply. Members of this community have the most direct link to managed fishery species. The soft bottom community provides food either directly or in the form of eggs and larvae broadcast into the water column.

3.3.2 Hard Substrate Habitat

Most of the 11,844 sq. m. of hard substrate is vertically oriented around the shoreline perimeter and at the edge and side-slopes of dredged navigation channels. The hard substrate is primarily colonized by algae and invertebrates and is either artificially constructed of concrete or metal or occurs as mechanically exposed natural geological formations. Artificial vertical substrate constitutes the bulk of the existing shoreline, installed as part of the construction of Honolulu Harbor pier and wharf structures. These include 5,817 sq. m. of concrete piles and 317 sq. m. of metal sheet piles, with a total combined area of 6,134 sq. m. Natural hard substrate is exposed along steep slopes at the edges of dredged channels and docks often directly below pile footings and has a total estimated area of 5,710 sq. m (Figure 3).

The shoreline below the Sand Island Bridge and along Piers 41–42 consist of steep dredged slopes down to the channel bottom. Debris and boulders littering this slope provide substrate for the growth of individual coral colonies and fouling community organisms. Hard calcareous substrate was described from near the harbor bottom at edges of the dredged channels and existing docks (*AECOS*, 2014). Corals were distributed between man-made vertical substrate (31%) and natural hard bottom seafloor substrates (69%) at the base of pilings and along steep edges of previously dredged channels.

Fouling community organisms dominated the upper strata of both the natural and artificial hard substrates. This community consists of (in decreasing order) dead bivalves, tunicates, sponges, bryozoans, annelids, and crustaceans with about a third of the 64 taxa identified as introduced species. Macro-algae were not

common with only three species observed in the MRC survey and only 29 taxa observed during the *AECOS* survey. Coral colonies were present within the fouling community, and were also distributed along the entire depth of the hard substrates. A marine fouling community is an assemblage of plants and animals that adheres to, or fouls underwater objects (Naval Oceanographic Office, 1971). Most fouling species are able to tolerate certain changes in environmental parameters such as salinity and temperature. Species having similar environmental tolerances tend to occur together and characterize the fouling community for a given environmental regime. In Hawaii, certain species of fouling community established on new substrate, and grew to 1.5 cm. diameter in
2 months at 50 foot depth (Naval Oceanographic Office, 1971). In shallower water the growth rate would be even faster due to greater abundance and availability of planktonic food.

The man-made, vertically-oriented hard substrate within the Project area provides habitat that supports certain managed fisheries and acts as a de-facto marine protected area for many larger fish due to the regulatory ban on fishing in the harbor. In addition to shelter, the habitat provides food for managed fisheries either directly or in the form of eggs and larvae released into the water column. As such, this artificial, vertical substrate provides features consistent with a typical "coral reef" and that may support managed fisheries or their prey, but does not meet the description of a coral reef habitat composite constituting designated EFH for Coral Reef Ecosystem Management Unit Species, as described in the Final Fishery Management Plan for Coral Reef Ecosystems of the Western Pacific Region, Chapter 2 (WPRFMC, 2001) and the Fishery Ecosystem Plan for the Hawai'i Archipelago, Chapter 3 (WPRFMC, 2009).

3.3.3 Water Column Estuary Habitat

The Honolulu Harbor is an artificially deepened, inshore embayment with strong estuary characteristics influenced by inflow from perennial streams, groundwater, and storm drains from the surrounding urban and light industrial land use areas. With an area in excess of 300 acres and an average depth of 35 feet, the volume of the estuary greatly exceeds the average daily flow volume of all inflowing water sources. These characteristics provide for a relatively long residence time and allow the embayment to function both as a physical sink for land based pollutants and as a biological reaction vessel to transform and incorporate a portion of the land-based nutrients into the marine food web through the production of plankton. The stratified water column provides a variety of micro- habitats defined by light, salinity, nutrient availability, and plankton concentrations. Harbor waters are continually impacted by such terrigenous inputs that adversely affect its water quality.

Benthic Substrate Distribution Across Project Area

	sq m	Acres
Waters of the US (start of project)	33,200	8.13
Soft Substrate (Harbor Bottom)	22,832	5.64
Hard Substrate	11,844	2.92
Natural Hard Substrate	5,710	1.41
Coral on Natural Substrate	215	
Sand Isl Bridge Revetment	409	0.10
Man-made Hard Substrate	6,134	1.51+
Steel Sheet Piles	317	0.08
Concrete Piles	5,817	1.43
Sheet Piles	317	0.07
Coral on man-made substrate	59	

Figure 3. Areas of Habitat Types across the Project Area

Note that the area of "Hard Substrate" plus "Soft Bottom" is greater than the total area due to the vertical nature of the hard substrate. Dredging and excavation area is 8.42 acres that includes 2.78 acres of fast land and 5.64 acres of harbor bottom soft substrate.

3.4 ESSENTIAL FISH HABITAT OCCURRING WITHIN THE PROJECT AREA

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The MSA provisions at 50 CFR 600.10 provide further definition for the purpose of interpreting EFH as follows:

> *"Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle*

Waters and substrate within the harbor are designated as EFH for managed fishery species listed in Table 2 below. Underwater surveys were performed to identify and characterize both the waters and substrates in the project area. Benthic surveys identified and quantified marine biota to include macro-invertebrate, fish, and coral species populations.

The Project area is located within the boundaries of the Hawaiian Archipelago Fishery Ecosystem Plan (FEP; WPRFMC, 2009a). The place-based FEP uses an ecosystem-based approach with “geographically defined ecosystem plans containing identical fishery regulations.” The FEP identifies and categorizes Management Unit Species (MUS) based on the managed fisheries and incorporates all of the management provisions of the former Fishery Management Plans, with updates. MUS known to be present in waters around the Hawaii Archipelago include Bottomfish and Seamount Groundfish MUS (BMUS), Crustaceans MUS (CMUS), Precious Corals MUS (PCMUS), and Coral Reef Ecosystems MUS (CREMUS). Pelagic MUS (PMUS) are managed separately through the Pacific Pelagic FEP. According to the Hawaii Archipelago and Pacific Pelagic FEPs, the following MUS and life history stages are identified as likely present at, near, or dependent on the Project area:

- BMUS: all life stages for shallow complex, eggs and post-hatch pelagic for intermediate and deep complexes.
- CMUS: all life stages.
- CREMUS: all life stages
- PMUS: all life stages.

According to the EFH designations in the Hawai‘i FEP, Honolulu Harbor is absent of EFH for precious corals, deep-water shrimp, or seamount ground fish. No juveniles or adults for either BMUS or CMUS were recorded from surveys within the harbor.

The Hawai‘i and Pelagic FEPs further identify ecologically valuable subsects of EFH for the above MUS as “habitat areas of particular concern” (HAPC). These HAPCs are based on the importance of the ecological functions provided, the sensitivity to human or development-induced environmental degradation or stress, and rarity. There are no HAPC within, adjacent to, or near the project area that may be affected by the KCT Wharf and Dredge project.

The following table indicates the EFH designations for each of the MUS that may occur within the Project area:

Table 2: Designated EFH within Project Area, Honolulu Harbor

MUS	Species Complex	Designated EFH
CREMUS+	All currently and potentially harvested coral reef taxa	Water column and all benthic substrate to a depth of 50 fm from the shoreline to the EEZ
BMUS (all stages)++	Bottomfish Shallow Complex	Eggs and post-hatch pelagic: Water column from the surface to 240 meter depth from the shoreline to the EEZ. Post-settlement and Sub-adult/adult: Water column from the surface to 240 meter depth from the shoreline to the EEZ
	Bottomfish Intermediate and Deep complexes	Eggs and post-hatch pelagic: Water column from the surface to 400 meter depth from the shoreline to the EEZ.
CMUS+	Spiny/Slipper Lobster and Kona Crab complexes (all stages)	Eggs and larvae: water column from the surface to 150 meter depth, from the shoreline to the EEZ Juveniles and adults: bottom habitat from the shoreline to 100 meter depth
PMUS+++	Temperate/Tropical Species, Sharks and Squid complexes	Eggs and larvae: water column from the surface to 200 meter depth, from the shoreline to the EEZ. Juveniles and adults: water column from the surface to 1,000 meter depth, from the shoreline to the EEZ.

+Western Pacific Regional Fishery Management Council, 2009a.
++ Western Pacific Regional Fishery Management Council, 2016.
+++ Western Pacific Regional Fishery Management Council, 2009b.

4.1 MARINE BIOTA OCCURRING WITHIN THE PROJECT AREA

4.2 GENERAL

The types and abundance of marine biota identified within each sector are provided in the Project's two marine surveys conducted by MRC (2012) and *AECOS* (2014). The second baseline survey was necessitated by a molasses spill into the harbor in September 2013 caused by a cargo loading malfunction unrelated to the Project. The MRC survey report is retained for its general observations concerning the harbor ecosystem, but only the *AECOS* dataset is used for quantification of the Project's environmental baseline.

AECOS surveyed a total of 1,942 sq. m. of the hard substrate, plus additional randomly selected point surveys across an area of soft substrate in the Project area. Each sector was divided into four segments which were independently surveyed. Designations of sectors surveyed during both efforts are shown in Figure 4. Sectors B (1-3) through J are within the Project area. Sectors A, B (4), K, and L are outside the Project area and act as control areas. The locations of each segment are shown in the survey documents from *AECOS* attached as Appendix B to this report.

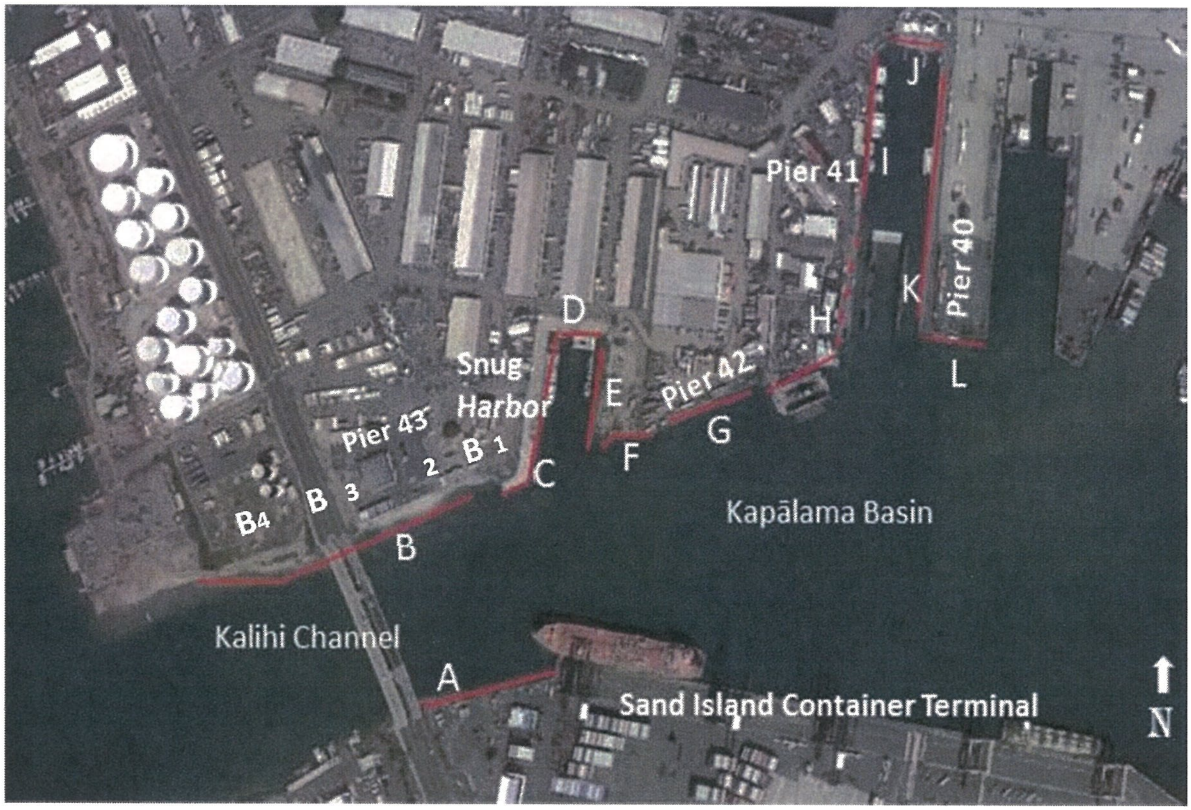

Figure 4. Survey Sector Areas

4.3 CORAL SPECIES

Porites lobata

Lobe coral (*Porites lobata*) is the most common and widespread coral in Hawaii. The growth form is most commonly massive but can be encrusting in high wave energy environments or plate-forming on steep calm slopes (or concrete pilings). Lobe coral spawns from July to August two to three days after the full moon and has a moderate 11.4 millimeters (mm) per year growth rate. Lobe coral was the most prevalent within the Project area, accounting for 58% of the total colony count and 88% of the total coral area. Of the estimated 167 "larger" coral colonies measuring >40 cm found in the project area, 153 are Lobe coral, representing 92% of this population.

Porites compressa

Finger coral (*Porites compressa*) is often the most common coral in low wave energy environments and has a rapid growth rate (28 mm per year; Minton, 2013) and tends to be very fragile. Finger coral spawns from June through September on the new moon's 1st quarter from 23:00 to 01:30. Finger coral was not common within the project area (< 1% of corals, 27 out of 82,324 colonies), but 25% of these colonies were >40 cm in diameter. Of the 167 coral colonies >40 cm. found in the project area, 7 are finger corals (4.2%).

Leptastrea sp.
Crust coral (*Leptastrea sp)* comes in a variety of relatively common species typically field identified by color and colony morphology in larger specimens, but it can be difficult to identify small individuals of this coral species. *Leptastrea sp.* has a reported radial growth rate of 10.3 mm per year and commonly forms large encrusting colonies on exposed reefs. Within the Project area, crust coral was the second most common coral identified (41%, 34,017 out of 82,324 colonies). But the colonies were <5 cm in diameter, and the total area of this entire species was about 7% of the total coral area.

Pavona varians
Corrugated coral (*Pavona varians)* grows in encrusting brown lumpy masses with curling ridges that make up the edges of the coral calices. This species is relatively common in shallow waters, in areas exposed to moderate to strong wave action in spaces between other corals. Colonies are typically small and rarely larger than 60 cm in diameter. This coral has a reported radial growth rate of 15.1 mm per year (Minton, 2013) and spawns in June during the full moon's third quarter between 19:05 and 20:15 (Kolinski and Cox, 2003). Within the project area, only 54 colonies are estimated to be present, representing less than 1% of the total population. Of the 167 coral colonies >40 cm found in the Project area, 8 are corrugated corals (4.8%).

Cyphastrea ocellina
Ocellated coral (*Cyphastrea ocellina*) typically has an encrusting morphology with small colonies that have large calices. This species spawns on a monthly basis releasing fertilized planulae directly into the water column, with slightly larger spawns during the months of April and June (Gulko, 1998). Only 29 colonies of this coral were found within the project area, 21 of which were less <5 cm in diameter.

4.3.1 Coral Coverage

The extent of the hard substrate within the Project area is not well represented by the 2D mapped area due to the vertical relief of much of the substrate. The area of hard substrate, incorporating its vertical (Z-axis) extent, was calculated from the *AECOS* (2014) benthic survey data in which counts/characteristics in each transect were used to estimate a larger (un-surveyed) area of each sector. Based upon the *AECOS* estimate that the transects covered 16.4% of the area, the total of all combined areas represented by the Project area benthic surveys is 11,844 sq. m, or about 2.92 acres (Table 3).

Table 3. Project Sectors Surveyed and Extrapolated to Total Habitat Areas

Sector	Survey Area m	Coral Colonies	Seafloor sq m	Piling sq m	Sheet Pile sq m	Sector Area sq m
B	240	4844	1560			1560
C	160	4602		1184		1184
D	44	526		279		279
E	796	12554	1250	3329		4579
F	60	2706	410			410
G	272	11608	1420	173		1593
H	42	4378			317	317
I	240	37164	1070	368		1438
J	88	3944		484		484
Total	1942	82324	5710	5817	317	11844

An estimated total of 82,324 coral colonies (+/- 1 standard error of mean of 14,632), representing 5 live species with a combined calculated colony area of 275 sq. m. was documented within the Project area (Table 3). About 30% of the corals were attached to artificial structures (concrete piles and sheet piles) and 70% were affixed to hard substrate exposed at the base of piles and edges of dredged slopes. An additional 124,099 corals were documented outside of the Project area, in the following Sectors: A = 8,701; B4 = 493; K = 109,558; and L = 5358). Corals outside of the Project area are of similar species and size range as those inside the Project area. Coral quantity estimates for each sector surveyed within the Project area are shown in Table 4.

Living coral cover within the Project area is 2.3% (275 sq m of 11,844 sq m). Four additional species of recently deceased corals (*Montipora capitata, M. patula, Pocillopora damicornis,* and *P. meandrina*) representing 3.5% of the total coral count were identified from their skeletal remains and do not contribute to the Project total coral area. The smallest size class (1–5 cm) made up 79% (64,988 of 82,324) of the live coral colony count within the Project area. Each subsequent larger size class contains only about 20% as many corals.

Coral species were not distributed evenly along the shoreline substrates. The distribution of all live coral species along the Project shoreline is shown in Figure 6. **Error! Reference source not found.** The distribution of corals larger than 40 cm in diameter is displayed in Figure 7. Over 99% of the coral colonies consist of only two common species *(Porites lobata* and *Leptastrea sp.*). The most prevalent species, *P. lobata*, 58% (48,198 of 82,324), ranging in size up to 1.6 meters in diameter accounted for 88% (241 of 275) of the area of all living corals.

The least prevalent live species was *P. compressa*, with 27 individuals estimated to be present.

Table 4. Coral quantity estimates, plus and minus one standard error of the mean, for each sector surveyed within the Project area.

	Coral Count	Survey Area m2	Sector Area	# coral per m^2	# Coral Est Mean	- 1 SEM	+ 1 SEM
B1	438	80	480	5.5	2628	843	4413
B2	169	80	600	2.1	1268	821	1714
B3	158	80	480	2.0	948	250	1646
C	624	160	1184	3.9	4602	2700	6504
D	84	44	279	1.9	527		
E-Piles	826	557	3329	1.5	5068	4000	6136
E-Shore	1078	180	1250	6.0	7486	4077	10895
F	396	60	410	6.6	2706	2605	2807
Gshore	1772	220	1420	8.1	11437	8620	14255
Gpiles	51	51.9	173.3	1.0	170	3	338
H	580	42	317	13.8	4378	3907	4848
I-Shore	4940	160	1070	30.9	33036	18237	47836
I-Piles	897	96	368	11.2	4126	3482	4770
J	717	88	484	8.1	3944	2961	4926
TOTAL	**12,730**	**1,899**	**11,844**		**82,324**	67,692	96,956
			Average ->	**7.0**			

Larger corals have a higher ecosystem service value than small corals. Their increased size provides greater habitat cover for fish and invertebrates, provides greater wave and current resistance, and produces much more efficient spawning. Corals <40 cm in diameter provide limited structure, which in turn limits the amount of habitat provided to other organisms as well as the capacity of the coral to sustain the surrounding ecosystem or provide significant resilience capacity. Corals in the smallest size class (<5 cm) perform minimal functions in terms of habitat provision, primary or indirect production, or ecosystem resilience capacity. Although corals >40 cm account for less than 1% (167/82,324) of the population count, they provide 25% (69 sq. m/275 sq. m.) of the living coral area (Table 5, Figure 5).

Table 5. Coral Present within the Project Area (as extrapolated from *AECOS* survey findings)

Project Area Only (B1, B2, B3, C1, C2, D, Epile, Eshore, F, Gshore, Gpile, H, Ishore, Ipile, J)

Size class ->	1-5cm	6–10cm	11-20cm	21-40cm	41-80cm	81-160 cm	>160cm	Total #	Coral m^2
Cyphastrea ocellina	21	0	7	0	0	0	0	29	0
Leptastrea	32444	1560	13	0	0	0	0	34017	23
Pavona varians	23	15	8	0	8	0	0	53	2
Porites compressa	14	0	0	7	0	7	0	27	8
Porites lobata	32486	11064	3778	717	134	19	0	48198	241
Total Count	64988	12639	3806	724	141	26	0	82324	
Area m^2	32	55	67	51	40	29			275
			205		69				

Seafloor (B1, B2, B3, Eshore, Gshore, Ishore)
Project Area Only

Size class ->	1-5cm	6–10cm	11-20cm	21-40cm	41-80cm	81-160 cm	>160cm	Total #	Coral m^2
Cyphastrea ocellina	14	0	7	0	0	0	0	21	0
Leptastrea	13943	1059	13	0	0	0	0	15015	12
Pavona varians	0	0	0	0	0	0	0	0	0
Porites compressa	14	0	0	7	0	7	0	27	8
Porites lobata	28035	9609	3368	621	101	7	0	41741	196
Total Count								56804	
Area m^2	20	47	60	44	28	15			216
			171		43				

Piles and Sheetpiles (C1, C2, D, Epile, F, Gpile, H, Ipile, J)
Project Area Only

Size class ->	1-5cm	6–10cm	11-20cm	21-40cm	41-80cm	81-160 cm	>160cm	Total #	Coral m^2
Cyphastrea ocellina	8	0	0	0	0	0	0	8	0
Leptastrea	18501	501	0	0	0	0	0	19002	11
Pavona varians	23	15	8	0	8	0	0	53	2
Porites compressa	0	0	0	0	0	0	0	0	0
Porites lobata	4451	1455	410	96	33	12	0	6457	46
Total Count								25520	
Area m^2	11	9	7	7	11	14			59
			34		25				

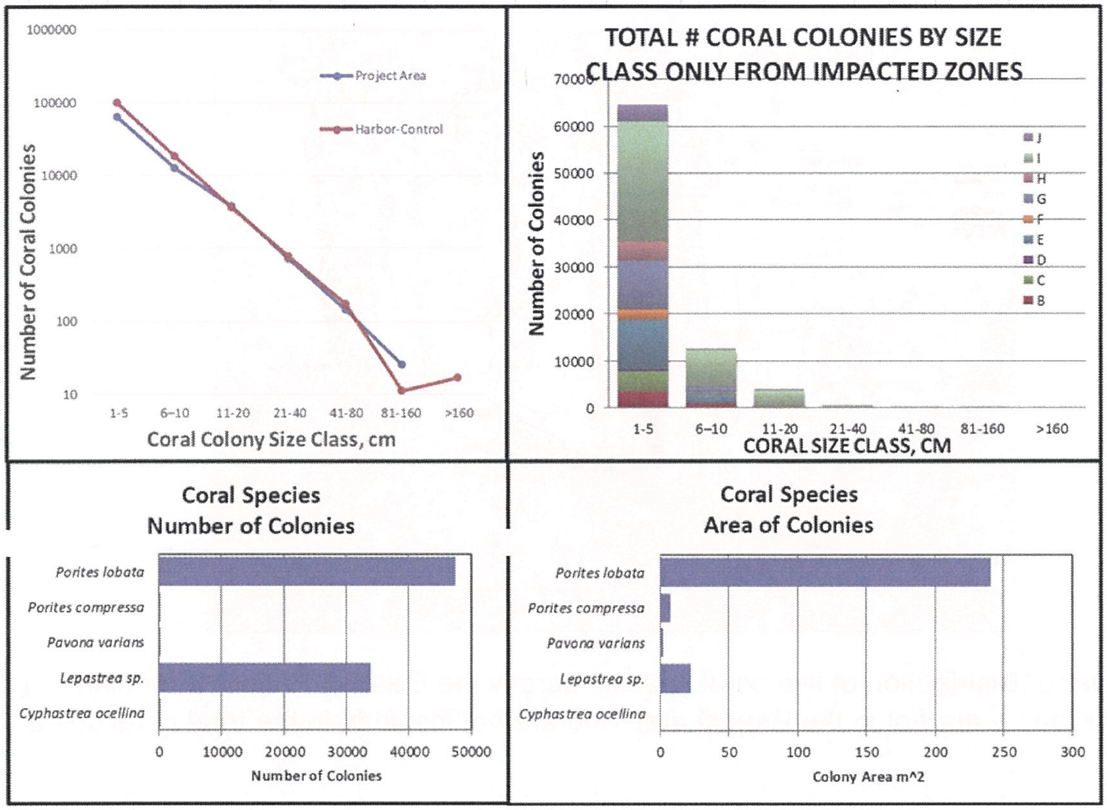

Figure 5. Coral Colonies by Size Class, Number of Colonies, and Colony Area (*AECOS*, 2014)

Top Left: The number of corals decreases about 80% in each succeeding larger size class. Corals in the surveyed sector K outside the Project area are used as harbor control data.

Top Right: Coral colony counts by sector and size class show that the smaller colonies are much more abundant.

Bottom Left: *Porites lobata* and *Leptastrea sp.* account for 95% of all colonies.

Bottom Right: *Porites lobata* accounts for highest coral area coverage followed by *Leptastrea sp.* Although the corals greater than 20 cm in diameter make up only about 1% of the total coral colony count as shown in top right, they completely dominate the contribution to total coral area.

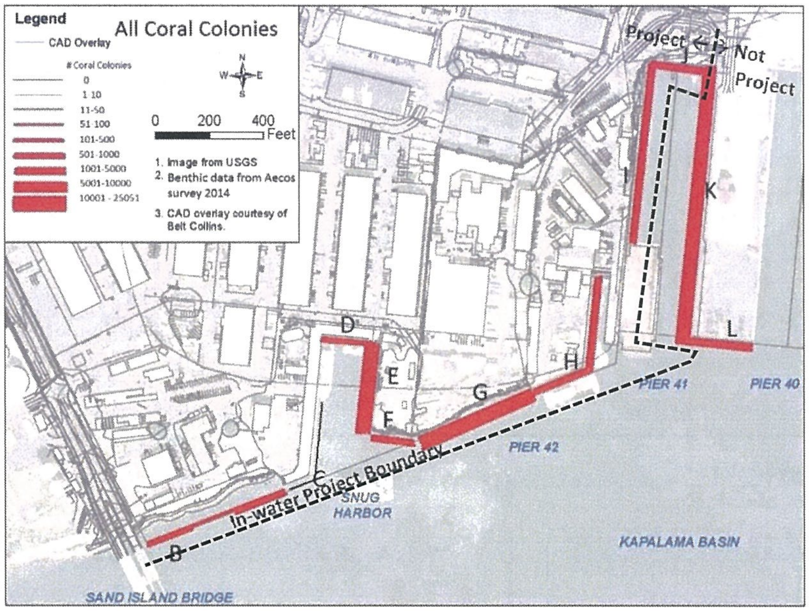

Figure 6. Distribution of live coral species across the Existing Project Shoreline Sectors K and L are not in the Project area and are not included in the total coral count.

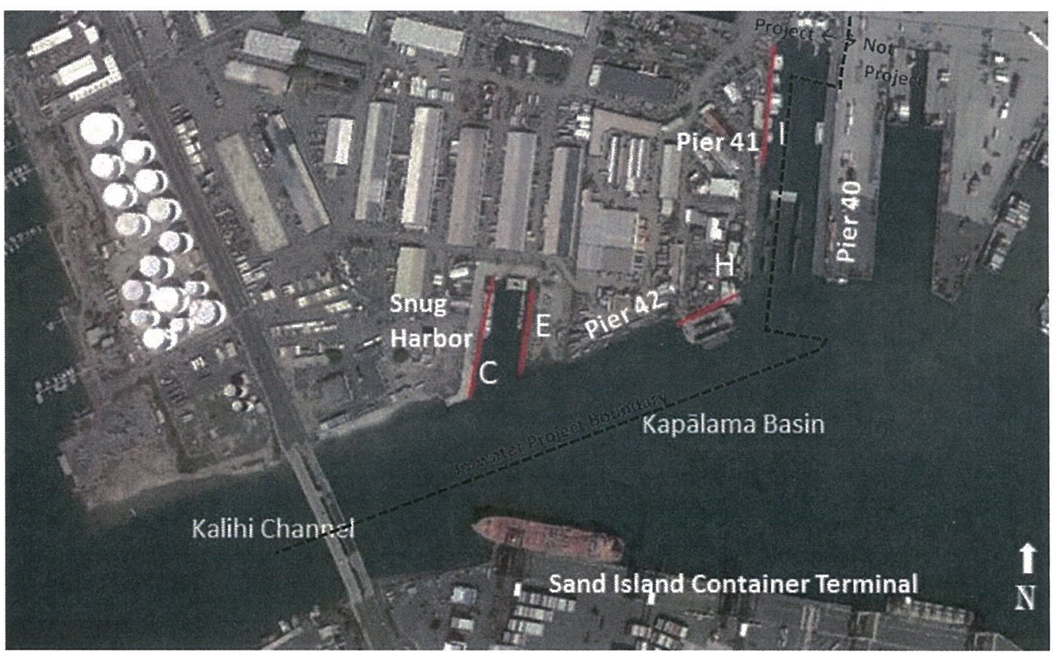

Figure 7. Distribution of live corals >40 cm displayed as red lines within Project area.

4.3.2 Harbor Control Site – Sector K, Pier 40

The face of Pier 40 is outside and immediately adjacent to the Project area. Surveyed as part of both baseline survey efforts, Sector K is comprised of a continuous sheet pile bulkhead pier face with significant (9.8%) coral cover. Sector K contains more coral colonies (109,548) than the rest of the project shoreline combined. Although the bulk of the corals (88,405) are in the smallest size category, the total surface area of corals in Sector K is about 299 sq. m. This area would be used as the control site to assess the efficacy of during- construction BMPs to protect corals and as a comparison for growth rate and survival of corals transplanted from the construction site to other areas (Figure 10). Further discussion on the use of the control site is included in the Coral Transplantation Plan (Appendix C).

4.4 MACRO-INVERTEBRATES

As in most quiescent harbors, much of the hard substrate in the lower tidal and shallow sub-tidal zones is colonized by a diverse fouling community. Many of the sun-lit piles and sheet piles within the Project area are densely colonized by macro- invertebrates. A total of over 64 taxa of macro-inveterbrates, 15 of which are not native to Hawaii, were tabulated. The population is dominated by dead bivalves (5 species) and live tunicates (4 species) with sponges (20 species) and bryozoans (5 species) also prevalent (Figure 8). The large majority of these organisms are filter feeders. Although there was typically an abundance of dead mollusk shells covering all vertical substrates, the relative abundance of living mollusks was low.

The initial marine biological survey (MRC, 2012) noted a prevalence both of large dead mollusk habitats and large coral colony skeletons overgrown with fouling organisms and occasional new coral recruits. The molassas spill resulted in a further large die-off of corals of all sizes. Data from the surveys show an 80 % reduction in coral specimen numbers for each increase in the size class.

The above factors indicate that the harbor is a challenging environment for both bivalve and coral survival. The abundance of mollusk shells and coral skeletons (even prior to the molasses spill) suggest periodic severe water quality stressors that may dominate the long-term development of biological structures within the harbor. The general fouling community was more abundant upon the artificial vertical substrates than upon the deeper, natural shelf substrates at the channel edges. In contrast, corals were more abundant upon the deeper natural shelf substrates. High density of burrow holes within the soft mud substrate of the harbor floor within the Project area was noted in both surveys. The percentages of non-coral invertebrates are shown in Figure 8.

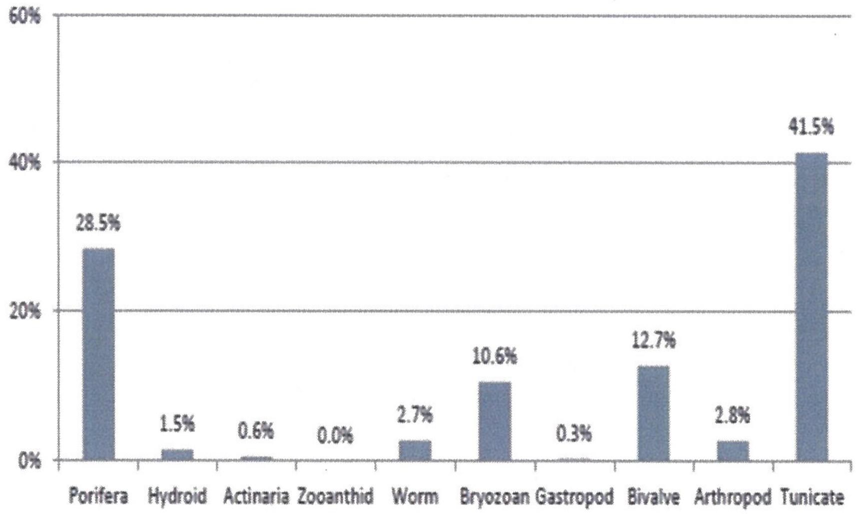

Figure 8. Percent of Non-Coral Invertebrates in Major Groups, All Sectors Combined (*AECOS*, 2014)

4.5 FISH

Two types of surveys were conducted: 25-meter long belt transects, and 5-minute single point counts, each providing an independent estimate of the fish species and population levels present in the Project area. Traditionally, belt transects are assumed to quantify more cryptic sedentary species as one moves over the surface, whereas stationary point count surveys (SPC) are assumed to count more large species as they swim into view. The area of the harbor comprised of hard substrate edge habitats (i.e. excluding the mud habitat of the harbor bottom), as calculated from the fish surveys, is estimated to be 10,594 sq. m (2.5 acres). The 3,085 individual fish counted and identified within the transect areas are extrapolated to this total area. Note that this is about an 11% lower estimate than the edge habitat hard substrate area as calculated from the coral surveys (11,844 sq. m).

All fish were identified to species, where possible, and lengths were estimated, yielding a calculated estimate of the weight of each fish. In the analysis provided in Figure 9, the fish have been allocated to a number of trophic levels, depending primarily on their dietary habits. The total number and weight of fish are estimated from both the SPC and Belt transect methods and scaled against NOAA baseline average reef data to represent the average fish mass by trophic level per hectare (Ha; Figure 9).

The fish community at the Project area is well represented with 68 species (*AECOS*) (56 by MRC) identified. A total estimated 5,701 to 7758 individual fish (by belt transect and SPC transect, respectively), with an average of 9 to 17 different species represented in each sector, are estimated to exist within the Project area with a total mass of 311 kg to 642 kg (294 kg/Ha and 606 kg/Ha). These calculated mass densities include a school of goldspot sardines estimated at 1,200 fish (31.5 kg). Other than the sardines, the most frequently observed fish were the ring-tailed surgeonfish, convict surgeonfish and yellow tang. Also common were the white- spotted toby, domino damselfish, threadfin butterflyfish, yellowfin surgeonfish, blacktail snapper, coronet fish, papio and raccoon butterflyfish. Barracuda were seen in several sectors, but may be more prevalent than indicated by the data, due to poor underwater visibility and this fish's tendency to avoid divers. Fish that feed on invertebrates or upon plankton tended to be more common in the Project area. Sectors E, B, and C yielded the highest fish counts, with sectors D and J yielding the lowest fish counts.

The transect at sector B encountered a large school of sardines, which may bias the average fish counts. Note that the tiger shark encountered in the Harbor Bottom sector is outside of the direct project impact area and that data is not included here.

AECOS DATA" --> INC REASING TROPHIC LEVEL-->

KAPALAMA HARBOR	Detritivore	Herbivore	Coralivore	Sessile invert feeder	Mobile Invert Feeder	Planktivore	Omnivore	Piscivore	TOTAL
Average B	1.2	125.5	0.9	61.8	114.9	28.5	0.0	37.0	369.8
Standard	0.3	58.1	0.2	36.8	35.5	17.8	na	15.1	126.5
SPC Biom	0.8	207.2	0.0	156.4	147.3	37.9	0.0	56.0	605.6
Standard	0.5	50.5	0.0	52.4	34.1	26.8	na	22.3	134.4
Belt Biom	1.4	99.3	1.1	31.4	104.5	25.4	0.0	30.9	294.1
Standard	0.3	96.9	0.4	42.6	57.2	19.4	na	16.2	194.6
Average D	128.3	2595.3	3.4	574.8	724.8	868.9	0.0	549.3	5444.9
Standard	65.9	848.1	-	337.5	273.4	555.4	na	224.6	0.0

SPECIES RICHNESS (/15m Diam	
mean	2.67
SEM	2.67

3,085 TOTAL FISH COUNTED IN ALL PROJECT AREA TRANSECTS IN HARBOR
5,788 TOTAL FISH ESTIMATED PRESENT IN PROJECT AREA OF HARBOR
392 Kg of FISH ESTIMATED PRESENT IN PROJECT AREA OF HARBOR

Figure 9. Fish Transect Data from Project Area Adjusted to Per Hectare Density

5.1 POTENTIAL EFFECTS OF THE ACTION ON EFH AND MUS

Because of the magnitude and range of activities represented by the Project, this section analyzes the potential impacts first, by each individual Project phase, and second, by type of Project impact. Each phase varies by construction method and likewise, potential vectors for impact to EFH. Project phasing or sequencing is illustrated in plans attached as Appendix A.

5.2 EFFECTS BY PROJECT PHASE

The action, anticipated to begin in 2018, would incorporate 8 construction phases lasting approximately 36 months, followed by operation of the facility. Impacts from turbidity plumes stirred by prop wash of work vessels would be present during all in water work phases and contained within the work areas to the greatest extent practicable through implementation of in-water BMPs. Activities occurring within the following construction phases are discussed in greater detail below: above waterline installation beneath Kalihi Channel, demolition of existing shoreline facilities, shoreline bulkhead construction and Sand Island Bridge scour protection, enclosing and filling of Snug Harbor, the Rail Slip, and Pier 40F, shoreline excavation, harbor dredging, offshore or upland disposal of excess dredged material, and wharf infrastructure and surface facilities construction. Indirect impacts from each Project phase are discussed in each of the following sections and summarized in Section 5.3.

5.2.1 Waterline Installation Beneath Kalihi Channel

Two waterlines would be installed under the Kalihi Channel using horizontal directional drilling with entry and exit pits located in uplands adjacent to the Project area and on Sand Island, located several hundred feet from harbor waters to prevent inadvertent discharges. Appropriate BMPs would be implemented at the drilling and receiving pits to prevent storm water runoff and drill effluent from leaving both sites.

Directional drilling a pipeline 50 to 70 feet beneath the seafloor of the Kalihi Channel in Honolulu Harbor eliminates water column and substrate disturbances or alteration. At depths of 50 feet or more, the pipe would be protected from the action of waves and preclude indirect disturbance of EFH. Placed at this depth, permanent embedment in marine mud would reduce the likelihood of any releases or possible spills of the drill hole ("frac-out").

The activities proposed under this phase would not reduce the quantity or quality of EFH. Accordingly, the Corps has determined the waterline installation beneath the Kalihi Channel would neither adversely affect nor have the potential to cause effect to any MUS or its designated EFH.

5.2.2 Demolition of Existing Shoreline Facilities

Potential vectors for impact to MUS and their designated EFH include impacts to water quality resulting from demolition of the existing shoreline, associated facilities and the physical removal of natural, hard substrate that constitutes EFH and artificial, vertical structures that provide substrate that supports habitat for MUS species and their prey. All hard substrate, natural and artificial, including the associated biological communities for which it supports, would be lost. Demolition activities occurring from land and in marine waters have the potential to suspend sediments and elevate turbidity as well as generate petroleum-based pollutant plumes associated with the operation of heavy machinery atop work barges and shore-side areas, or release terrigenous constituents from buried soils.

To minimize impacts to surrounding EFH, appropriate sediment containment BMPs would be implemented throughout construction to isolate turbidity within the work area. The degree of indirect impacts from these pollutants depends on the success of BMPs. Suspended materials can directly or indirectly impact MUS and EFH including potential impacts such as health detriment to swimming MUS or plankton blooms of unknown potential impact.

The proposed demolition activities would cause the following impacts to MUS within the harbor, at the work area:

- Short-term loss of benthic fouling community habitat that supports eggs, larvae, or prey species of MUS' on the 11,844 sq m (2.9 acres) of hard substrate.
- Permanent loss of 82,157 corals <40 cm diameter over an area of 275 sq m and all sessile invertebrate communities (tunicates, sponges, hydroids, annelids, mollusks, etc.) currently colonizing hard substrate that is proposed for removal. Loss of the biological community would result in the loss of forage area provided by the existing fouling community to herbivorous and invertebrate-feeding fish in the community.

The activities proposed under this phase would reduce the quantity and quality of EFH and accordingly, would result in the following adverse effects to EFH in the work area:

- Permanent, physical removal of approximately 11,844 sq. m. (2.9 acres) of existing hard substrate and associated biological communities. The loss of natural substrate (dredged channel slopes) results in the reduction in quantity of EFH, and the loss of man-made vertical structures (concrete piles, bulkheads, etc.) results in the reduction in quantity of habitat that supports MUS and other prey species.
- Temporary elevated turbidity levels resulting from resuspension of sediments in the water column would cause disruption of natural

reproductive processes involving eggs and larvae for MUS and their prey species, resulting in reduction of the quality of EFH.

5.2.3 Shoreline Bulkhead Construction and Sand Island Bridge Scour Protection

The pier face of the new shoreline would consist of a driven king pile and sheet pile wall. Most of the wall would be installed in uplands located well inland of the existing shoreline. In-water pile installation would occur across the mouth of Snug Harbor and the Rail Slip and along Pier 40F. To protect against scouring, the west end of Pier 43 near the Sand Island Bridge would be lined with a rock revetment. This would result in a permanent loss of 409 sq. m. of existing, natural hard substrate to be replaced with armorstone.

The proposed construction activities would cause the following impacts to MUS within the harbor, at the work area:

- The in-water construction of the rock revetment at the west end of Pier 43 would permanently replace the existing natural substrate and associated biological community resulting in the permanent loss of all sessile invertebrates and 494 colonies of corals measuring less than 20 cm. in diameter. Loss of the biological community would result in the loss of forage area provided by the existing fouling community to herbivorous and invertebrate-feed fish in the community.

The proposed bulkhead construction in and across marine waters would reduce the quantity of EFH and accordingly, would result in the following adverse effect to EFH in the work area:

- Pile installation would permanently sever open marine water and benthic substrate at Snug Harbor and at the Rail Slip, to facilitate filling waters of the U.S. to be converted to uplands and resulting in a reduction in the quantity of designated EFH.

5.2.4 Enclosing and Filling Snug Harbor, the Rail Slip, and Pier 40F

Snug Harbor, the Rail Slip, and Pier 40F would be filled with dredged material. Fill would be placed by barge- or shore-mounted equipment. The total fill area is 10,170 sq. m. (2.49 acres) of marine waters. Filling activities are expected to generate elevated turbidity levels in the immediate work area and potentially surrounding harbor waters. To the greatest extent practical, implementation of appropriate BMPs would confine any turbidity plumes to the work area and minimize disbursement of construction-generated turbidity to surrounding waters.

Enclosing and filling of Snug Harbor, the Rail Slip, and Pier 40F would reduce the quantity and quality of EFH and accordingly would result in the following adverse effects on MUS and designated EFH in these areas:

- Permanent loss of 10,170 sq. m. (2.49 acres) of water column and substrate EFH, including associated biological community consisting of corals and other sessile biota, with permanent conversion to uplands at Snug Harbor, Rail Slip and Pier 40F bulkhead, resulting in a reduction of quantity of designated EFH
- Elevated turbidity levels resulting from filling activities would temporarily impair water quality and result in the reduction of quality of EFH immediately adjacent to the filling activity.

5.2.5 Shoreline Excavation

The excavation of uplands to facilitate construction of the wharf face inland of the existing shoreline would create a total of 2.78 acres of water column and benthic substrate, thereby permanently increasing the total quantity of EFH. A total of 319,740 cu. m. (417,900 cu. yd.) of material would be excavated and dredged to achieve design depths of -30 and -40 feet mean lower low water (MLLW) plus two-foot over-dredge. Shoreline excavation activities are likely to have impacts similar to that of dredging, except that the terrigenous sediments may have the potential to contain and release land-based pollutants.

Potential adverse impacts would be avoided or minimized through implementation of appropriate construction BMPs and water quality monitoring. All measures such as full surround silt curtains and strict maintenance of excavating equipment would be implemented to comply with Section 404 and Section 401 permit conditions during shoreline excavation. This would ensure adequate control of silt plumes and prevent adverse impacts on the benthic community immediately adjacent to the excavation area.

Excavation of the shoreline and dredging to the design depth would reduce the quantity and quality of EFH and accordingly would result in the following adverse effect to designated EFH within and adjacent to the dredge area in the Harbor:

- Permanent loss of existing vertical shoreline hard substrate and associated biological communities would result from shoreline excavation. The loss of natural hard substrate results in the reduction in quantity of EFH and the loss of man-made vertical structures such as sheet piles and concrete pilings results in the reduction in quantity of habitat that supports MUS and other prey species.

Excavation induced elevated turbidity levels would temporarily impair water quality, resulting in a reduction of quality of EFH. Such a stressor could affect immediate and adjacent communities including the potential to stimulate plankton blooms as a result of increased levels of sediment-borne nutrients dissolved into the water column.

5.2.6 Harbor Dredging

Material that can't be excavated from the shoreline would be mechanically dredged from the harbor using barge-mounted equipment to achieve the design depths of -30 and -40 feet MLLW, plus two-foot over-dredge. The total volume of removed materials through excavation and dredging is estimated at 319,740 cu m (417,900 cu yd).

Dredging would remove both hard substrate and soft sediments and other habitats that support MUS and their prey. Biological communities supported by the substrate would also be lost. In-water dredging operations would elevate turbidity levels by disturbing and re-suspending benthic sediments into the water column that could affect water quality in both immediate and adjacent areas.

Dredging-induced inadvertent discharges would be minimized to the greatest extent practical through use of an "environmental bucket" clamshell dredge. Impairments to water quality stemming from dredging operations would be contained to the greatest extent practical to minimize adverse effects to EFH through implementation of appropriate sediment containment devices such as full-depth silt curtains to encircle dredging operations. Due to the lack of surface currents in the embayment, it is anticipated that the suspended sediments would naturally settle rather quickly upon completion of the dredging operations. In addition, removal of accumulated sediments from the seafloor would reduce sediments available for resuspension by prop wash or other disturbances typical of a harbor environment. Water quality monitoring before, during and after dredging operations would ensure return to pre-dredge, ambient levels.

Dredging hard substrate and soft sediments would reduce the quantity and quality of EFH and accordingly would result in the following adverse effects to designated EFH within and adjacent to the dredge area:

- Permanent loss of hard substrate and soft sediment resulting in reduction in quantity of designated EFH for CRE-MUS, all life stages and CMUS, juveniles and adults and habitat that supports MUS and their prey.
- Permanent loss of associated biological communities including soft bottom infauna invertebrate species resulting in reduction of quality of EFH for MUS, especially prey species.

- Generation of elevated turbidity levels from suspension of sediments causing temporary degradation of water quality in the immediate vicinity of the dredging operation to include de minimis discharges and disturbance of the benthos and also any dredged material transport from and within the silt curtains resulting in reduction of quality of water column EFH for all MUS occurring within the Project area.

5.2.7 Offshore or Upland Disposal of Excess Dredged Material

The disposition of dredged material from the Project is dependent upon the sediment characteristics and origin. Uncontaminated materials permissible for re-use include discharge in waters of the U.S. to fill Snug Harbor, the Rail Slip and Pier 40F and upland disposal atop filled areas. Material not fit for nearshore or upland re-use would be transported, upon approval from USEPA, to the SOODMDS for disposal. Dredged material unfit for ocean disposal or beneficial reuse would be disposed of at an approved upland disposal site. Upland disposal areas are absent of designated EFH.

The proposed disposition of dredge material on-site or as fill within a properly contained upland area would not reduce the quantity or quality of EFH and, therefore would not adversely affect EFH.

All barges used to transport dredged material for ocean disposal would be water tight to prevent any leaks or other discharges of dredged effluent that are not regulated under Section 404 of the Clean Water Act. The effect discharge of dredged material to fill Snug Harbor, the Rail Slip and Pier 40F would have on EFH is previously discussed in Section 5.1.4, above.

The proposed transport of dredged material to the SOODMDS for ocean disposal would not reduce the quantity or quality of EFH and, therefore would not adversely affect EFH. Ocean disposal of dredged material is authorized by USEPA and is beyond the Corps' federal control and responsibility to regulate.

5.2.8 Wharf Infrastructure and Surface Facilities Construction

Under the greater KCT Project, the constructed wharf would be reinforced with a deck, consisting of a 21-inch thick concrete pad and would include installation of necessary infrastructure utilities. The construction of these facilities is on fast land and within the sheet pile bulkhead constructed in preceding phases. To reiterate, such activities occurring entirely in uplands are not within the Corps' authority to regulate and are therefore beyond the Corps' federal control and responsibility to evaluate. However, such activities occurring in an area absent of EFH are discussed herein, as they have the potential to affect adjacent EFH. Appropriate use of BMPs to isolate the work areas would be implemented to the greatest extent practical to avoid and/or minimize adverse impact to EFH, including covering stockpiles and exposed erodible areas, and following accepted precautions when equipment is used or moved to prevent contaminants from land based construction reaching harborwaters.

The proposed construction has the potential to adversely affect EFH as a land-based source of sediments that could, if discharged into the harbor, degrade water quality and thereby reduce the quality of water column EFH for all MUS that may occur within the harbor. All construction activities would follow the NPDES permit requirements to prevent water pollution. Strict adherence to the permit would eliminate the potential for adverse effects to EFH.

5.3 EFFECTS BY TYPE OF IMPACT

Substrate and water column EFH loss and water quality degradation are common between construction phases. In this section, potential adverse impacts upon EFH and MUS by type of impact are discussed. Due to the extensive classification of thousands of managed fishery species collectively considered under several MUS', the following discussions would be generalized to the impact upon each specific fishery type.

Project-related impacts to substrate EFH include physical loss of substrate (soft and hard) that would reduce the quantity of EFH. Impacts to water column EFH include water quality degradation that would reduce the quality of EFH during construction. MUS impacts may include physical loss of biota and loss and degradation of habitat that supports MUS' and their prey and that has the potential to reduce the quality of designated EFH.

5.3.1 Loss of Physical Habitat

The loss of hard substrate habitat is limited to four habitat types, each of which has been either constructed or significantly altered by previous navigation enhancement projects.

• Man-made harbor structures (loss to excavation, demolition, and dredging) 452 concrete piles & sheet pile along existing 4,190 ft. shoreline	6,134 sq m. (1.51 acres)
• Channel edge and miscellaneous hard litter	5,710 sq m. (1.41 acres)
• Shallow intertidal substrate near abutment of Sand Island Bridge (loss by cover with armor stone and quarry rock)	409 sq m (0.10 acre)
• Harbor floor soft-bottom substrate (loss by dredging)	22,832 sq m (5.64 acres)

The total loss of existing hard substrate (concrete, sheet piles and dredged channel slope) is estimated at approximately 11,844 sq. m. (2.9 acres), located along the 1,277 m (4,190 ft.) of existing shoreline, all of which is either man- made or man-modified. However, the Corps considers this loss temporary, as it would be immediately replaced by similar sheet pile habitat along the entire 972 m (3,190 ft.) of new shoreline. The resulting shoreline would have a larger vertical area, as it would be deeper than the present shoreline, and a smaller lateral extent, measuring about 305 m (1,000 ft.) shorter in length due to the loss of Snug Harbor and the Rail Slip.

Loss of hard substrate would include loss of the associated biological community, including the majority of fouling community organisms such as algae, corals, sponges, mollusks, hydroids, and other invertebrates. A total of 82,157 live corals <40 cm in diameter are expected within the proposed construction site, with 56,691 of these corals associated with seafloor natural hard substrate. An assessment of the data obtained during the benthic survey (*AECOS*, 2014) indicates that there are approximately 171 sq m of small (<40cm diameter) corals on the harbor seafloor and 34 sq. m. of small coral colonies on piles and sheet piles. These corals would be lost as part of the demolition and dredging phases of the Project.

Assuming average coral growth rates for Hawaiian corals (Minton, 2013), it would take about 7 years for corals growing on the new sheet-pile substrate to recover the loss of all corals less than 40 cm in diameter.

Corals growing on vertical man-made structures (e.g. pilings, bulkhead, etc.) do not constitute a coral reef habitat composite (EFH for CREMUS). Coral reefs are described in the CREMUS FMP as "patchworks of hard and sediment bottoms" and in the Hawaiʻi FEP as "carbonate rock structures at or near sea level that support viable populations of scleractinian or reef-building corals". Furthermore, the Western Pacific Region Fishery Management Council, in designating EFH for CREMUS, considered designating individual reef building corals as EFH, but rejected that specific alternative in favor of a habitat composite approach. While coral reefs are considered EFH, individual corals are not. The Corps interprets coral reef/hard substrate habitat composite designated EFH for CREMUS to mean, naturally occurring, hard bottom and not individual coral colonies or artificial vertical structures such as pilings or bulkheads that support coral growth.

DOT-Harbors is proposing to avoid direct physical impact to individual coral colonies within the direct project footprint that may provide habitat and ecological support to MUS and prey species. A total of 167 corals >40 cm in diameter measuring 69 sq. m. in cumulative area would be transplanted to another suitable area within the harbor. Because some corals >40 cm in diameter may not be appropriate for transplantation due to physical formation or other challenge, corals as small as 21 cm in diameter may be transplanted to achieve the 69 sq. m. areal transplant goal.

The existing soft substrate, debris-littered habitat loss totaling about 410 sq .m. (4,400 sq. ft.) at the abutment of the Sand Island Bridge would similarly be permanent, however considered temporary as it would be immediately replaced with rock and armor stone that would provide vertical relief and substrate for marine growth. The Corps expects the replacement substrate to provide opportunity for ecologically greater value and function in comparison to the existing shoreline.

The temporary unavoidable loss of physical habitat that could either be used by or provide forage for MUS totals 11,844 sq. m. (2.9 acres) of hard substrate and 22,834 sq. m. (5.6 acres) of soft sediment substrate.

5.3.2 Water Quality Degradation

In-water construction activities have the potential to generate turbidity through disturbance of the existing substrate causing resuspension of sediments into the water column, thereby raising ambient turbidity levels. Such elevated turbidity levels would degrade ambient water quality within the work area and immediately surrounding area. Elevated turbidity levels would be discrete, temporary and are expected to naturally dissipate, restoring water quality to ambient levels with no anticipated permanent impact to water quality. Suspended sediments, mostly sand, are expected to settle rather quickly upon completion of any in-water disturbances. Adverse impacts to the water column, primarily due to construction related turbidity, are likely to be very limited in both physical and temporal extent due to the lack of currents in the harbor and use of BMPs. The harbor is enclosed and usually subject to low velocity tidal currents which naturally and considerably limit the potential for turbidity plumes to be carried into adjacent habitats.

Given that the existing harbor is subject to regular bouts of high turbidity during periods of storm water runoff (Namba, 2004) and constant activity by large container ships, cruise liners and barges, it is not likely that temporary increases in turbidity from dredging would have any measurable impact upon mobile marine species. Corals and other marine biota in the harbor are continuously and frequently subjected to high turbidity plumes whenever the prop-wash from large vessels suspends sediments from the bottom. The biota colonizing this environment appears to be resilient to turbidity stress, as observed by their survivorship in such an active harbor environment.

As described in Section 2.4, the applicant has proposed BMPs (e.g., silt curtains) to contain re-suspended sediments in the immediate in-water work area during pile driving, dredging, excavation and other in-water construction activities to avoid spreading project-related, degraded water quality impacts to surrounding waters. In addition, the contractor would not conduct in-water construction activities that would compound upon adverse water quality impacts resulting from periods of heavy rainfall when flow from the adjacent Kapalama Channel would likely introduce very high turbidity levels. .

Additionally, DOT-Harbors is seeking a water quality certification under Section 401 of the Clean Water Act from the State of Hawaii Department of Health, Clean Water Branch (DOH-CWB). In order to obtain such certification, all proposed actions would comply with State water quality standards and must implement necessary and appropriate monitoring and BMPs to curtail water quality impacts, as documented in the DOT-Harbors Applicable Monitoring and Assessment Plan that would be submitted to the DOH-CWB for approval.

Table 6 below presents a summary of direct impacts to EFH with each Project phase.

Table 6. Summary of Direct Impacts to Essential Fish Habitat Associated with Each Project Phase

SUMMARY OF POTENTIAL ADVERSE AFFECTS ON EFH AND MUS FROM PLANNED ACTIVITIES ASSOCIATED WITH THE NEW KAPALAMA CONTAINER TERMINAL WHARF AND DREDGING PROJECT HONOLULU, O'AHU, HAWAI'I	**Project Phase**							
		I	2	3	4	5	6	7
ADVERSE EFFECT	**Type of Impact**	Waterline Installation	Demo Shoreline Facilities	Shoreline Bulkhead & Sand Island Bridge Scour Protection	Enclosing & Filling Snug Harbor, Rail Slip, & Pier 40F	Shoreline Excavation	Harbor Dredging	Offshore or Upland Disposal of Excess Dredged Material
Loss of man-made hard substrate habitat	**Loss of Physical Habitat and MUS**	N/A	P	P	P	N/A	N/A	N/A
Loss of natural hard substrate		N/A	P	P	N/A	P	N	N
Loss of natural soft substrate		N/A	N	N	P	N	P	N
Loss of biological assemblages colonizing hard substrate		N/A	S	S	S	S	N	N
Loss of biological assemblages colonizing soft substrate		N/A	N	S	P	N	S	N
Degraded water quality from phytoplankton blooms resulting from sediment plumes	**Water Quality Degradation**	N/A	N	N	N	N	N	N
Degraded water quality by generation of sediment plumes from in-water construction activities and construction vessel propeller wash		N/A	N	N	N	N	N	N
Decreased water quality from influx of petroleum products or toxic pollutants in groundwater		N/A	N	N	N	N	N	N
Decreased water quality from inadvertent construction wastes and discharges		N/A	N	N	N	N	N	N

1) Partially replaced loss by installation of 3,190 linear feet of vertical sheet/king pile

2) Replace loss by excavation and dredging of 11,254 m^2 (2.78 acres) of EFH

P = Permanent or long-term adverse effects
S = Short-term adverse effects
N = No effects due to adequate design or BMP implementation
N/A = Not applicable

5.4 SUMMARY OF SHORT-TERM AND LONG-TERM / PERMANENT EFFECTS

Summary of potential adverse impacts of the proposed project on EFH and MUS are discussed in this section.

The extent of temporal impacts to EFH is dependent upon the following factors:

- The intensity of the impact at the specific site being affected.
- The spatial extent of the impact relative to the availability of the habitat type affected.
- The sensitivity/vulnerability of the habitat to the impact.
- The habitat functions that may be altered by the impact (i.e. shelter from predators).
- The timing of the impact relative to when the species or life stage needs the habitat.
- The degree to which the adverse impacts are avoided or minimized through BMP use.

Some impacts would be avoided or controlled through Project design modification, BMP implementation, or regulatory oversight and are considered negligible. Such impacts are described below.

- Turbidity would be controlled through the use of silt curtains during construction. The low energy environment within the harbor reduces the spread and movement of plumes by current or wave action. Water quality monitoring would measure effectiveness of silt curtains (turbidity control), required as part of the State Water Quality Certification, in accordance with Section 401 of the Clean Water Act.
- The existing Project area is suspected to have subgrade pollutants likely to include petroleum hydrocarbons or other potentially toxic substances. During excavation of the shoreline, when these pollutants are most likely to be unearthed, absorbent booms (in addition to silt curtains) would be available for deployment to capture any floating hydrocarbons released during the process. The use of sealed-joint sheet/king piles should minimize the pollution threat from contaminants remaining inland of the new shoreline.

Short-Term Effects on EFH

Short-term effects result from actions that would cause temporary adverse impact to EFH or associated MUS, but are expected to be substantially restored through natural processes within one year.

- Removal of the shoreline hard substrate (itself a permanent impact) would have a short-term effect on the fouling community inhabiting this shoreline. The fouling community would rapidly recolonize on the new substrate. The nature of the fouling community would develop and evolve to emulate the pre disturbance conditions.

- Removal of soft substrate would have a short-term effect on the infauna community inhabiting the substrate. Infauna communities are well-adapted to radical changes in substrate and would rapidly recolonize the dredged substrate.
- Mobile MUS (i.e. fish and crustaceans) trapped behind the constructed sheet/king pile walls would be lost. Most fish in the vicinity would swim away from areas of higher turbidity. Although unlikely, any lost individual MUS would be negligible to the managed fishery and are expected to quickly recover.
- Impacts on water quality from the addition of nutrients or other growth factors would have temporary biological effects. Unlike particulate turbidity which settles out quickly, nutrients that leach from the sediment particles stay in the water column and would quickly be taken up by phytoplankton in the water. Because the harbor has a low rate of water turnover, an increase in nutrients has the capacity to result in a plankton bloom with possible indirect impacts. Such impacts would restore to equilibrium naturally.

Long-Term Effects on EFH

- A portion of the existing hard substrate, both natural shoreline and man-made structures would be replaced with the new KCT wharf face construction, however the final design would result in a net permanent loss of about 1,000 ft. of shoreline. Additionally, the shoreline would be replaced with nearly homogenous vertical relief and would remove all vertical diversity currently provided by existing pilings, deleterious concrete debris and other miscellaneous structures presently lining the Project area shoreline.
- Improvements in water quality due to the removal of polluted sediments presently on-site, the enhanced settling characteristics of the deepened harbor, and decreased pollutant inflow due to the enhanced storm water control features designed into the new wharf infrastructure are expected.
- Loss of 205 sq m of small (<40 cm in diameter) corals that support MUS' within the Project area (171 sq m on natural substrate and 34 sq m on man-made vertical substrate). Corals are expected to naturally recruit to replacement hard substrate.

6.1 PROPOSED MINIMIZATION AND OFFSET MEASURES

6.2 MINIMIZATION MEASURES INTERNAL TO THE PROJECT

It is DOT-Harbor's intent that a large majority of potential adverse impacts to EFH would be avoided or minimized through implementation of Project-specific BMPs before, during and post-construction. In addition, impact minimization measures incorporated into the Project design are intended to provide both immediate and long-term benefit to EFH in the harbor. Such benefits include:

- Use of lidded clamshell dredge buckets ("environmental buckets") that ensure containment of dredged material to minimize potential for incidental fallback of dredged spoils and minimize degradation of water quality during dredging activities;
- Increasing the water depth and removing accumulated sediments resulting from dredging activities that would improve water clarity and reduce opportunity for resuspension of fine, potentially contaminated sediments; and
- Replacing the existing pier face with a sheet pile wall with sealed edge joints to eliminate permeability and reduce groundwater infiltration and pollution of harbor waters, and construction of stormwater treatment facilities atop the newly constructed KCT to control and manage stormwater discharges before entering the harbor.

6.1.1 Best Management Practices

A summary of the construction BMPS to be implemented to avoid and/or minimize adverse impacts to EFH are discussed in Section 2.4.

6.1.2 Coral Transplantation

Removing corals from the Project area and transplanting them to another site is incorporated into the proposed action as an impact minimization measure. Two sites within the harbor have been provisionally selected as potential recipient sites. The transplantation plan (Appendix C) outlines the process for removal of 167 corals >40 cm diameter from the Project area that represents an area of 69 sq m. In the event that some of the >40 cm corals cannot be transplanted, then the 69 sq m live coral transplantation goal may be met by transplanting corals from 21 to 40 cm size classes. The corals would be removed from the Project area prior to the start of in-water construction.

In early coordination meetings between DLNR-Division of Aquatic Resources (DLNR-DAR) and DOT-Harbors, DLNR-DAR supports a small scale effort to further Hawaii's knowledge of transplantation efficacy using corals that DLNR-DAR expects to provide the greatest ecological value, fits DLNR-DAR's criteria for transplantation, and has the greatest potential for survival. DLNR-DAR is in favor of supporting actions that offer high potential value and chance of success for long-term ecological gain. For this reason, DLNR-DAR believes that coral transplantation combined with offset measure efforts would provide greater ecological benefits to marine resources in Hawai'i than only translocation. In addition, relocating all coral colonies in all size classes in the Project area to another site within the harbor would not meet such offset criteria. Accordingly, DLNR-DAR biologists recommended focusing transplanting efforts on those larger corals measuring >40 cm only, as opposed to smaller corals, for the following reasons:

- Ecological value of larger corals: The larger size class (>40 cm) is selected because theoretically and historically, larger coral colonies have been assigned more ecological value in terms of habitat, rugosity, shelter and volume of food they may provide. Larger colonies have been found to be more fecund, and thereby, capable of producing more gametes and contributing more reproductively to the ecosystem than smaller colonies (Hall and Hughes, 1996; Babcock, 1991).

- Reduce Risk of Alien Invasive Species (AIS) Introduction: Biologists from DLNR-DAR have expressed concern that the corals within the Project Area could be contaminated with non-native, invasive species and/or chemical pollutants due to their source from within the commercial harbor and based on prior surveys. The more colonies that are transplanted from this site (smaller colony size = more colonies transplanted), the higher the probability of introducing AIS to the recipient site. Therefore, limiting the number of coral colonies transplanted would reduce risk of introducing AIS to the recipient site. Divers can more accurately identify larger corals by their morphology and also more extensively assess presence of AIS attached to 167 large (>40 cm) colonies as opposed to >800 small (<40 cm) colonies.

- Long-Term Ecological Benefit: In addition to focusing transplantation efforts on the larger colonies, with low AIS risk, DLNR-DAR biologists recommend combining this minimization measure with additional minimization measures such as out-planting corals produced by DLNR- DAR's coral nursery and and additional offset measures such as invasive algae control via urchin biocontrol to achieve long-term ecological benefits for Hawaii's resources.

The transplantation quota is based both upon the total area and the coral size class of coral that could be directly affected within the Wharf and Dredge project footprint. All corals provide functional value to the ecosystem, but larger corals provide greater value, as discussed above. This value is often related to the area of the individual coral colony. Only the largest dimension (or dimension bin category) was recorded for each coral during the aquatic survey. Using this diameter to calculate the area as a circle provides a conservative over-estimate of true coral area. For small corals, this method likely results in reasonable estimates. However, as corals grow larger, their shape often deviates from that of a circle, and the calculated area can be larger than the actual coral area. To avoid this as much as possible, loss of coral coverage area within the Project Area, as well as the area covered at the transplantation sites were calculated using the dimension given in the survey reports.

Coral recipient site selection criteria:

- Within the same watershed
- Similar water quality
- Similar current conditions
- Similar light and depth
- Substrate capable of stabilizing new corals
- Should not be planned for future development
- Should not result in overcrowding of existing corals
- Acceptable to controlling government agency (USACE, DOH , DOT-Airports, DLNR)

As recommended by DLNR-DAR biologists, DOT-Harbors is only proposing sites located within Honolulu Harbor to prevent the potential spread of AIS or other harbor-specific component these harbor corals may harness, Candidate coral recipient sites within the harbor meeting the criteria listed above include:

- The boulder revetment on the west side of the main harbor entrance channel fronting the DLNR-DAR Anuenue Fisheries Research Center Facility (AFRC) and the Sand Island Community Park. The boulder revetment is a structure constructed by the USACE. A Section 408 permit for modifying a federal structure would be required from USACE to use this site for coral transplantation.
- The rock revetment at the tip of the Pier 5-6 public park off of Nimitz Highway between the Coast Guard Office (Pier-2) and the Maritime museum (Pier 6-7)

Locations currently identified for coral recipient sites are shown in Figure 10, below.

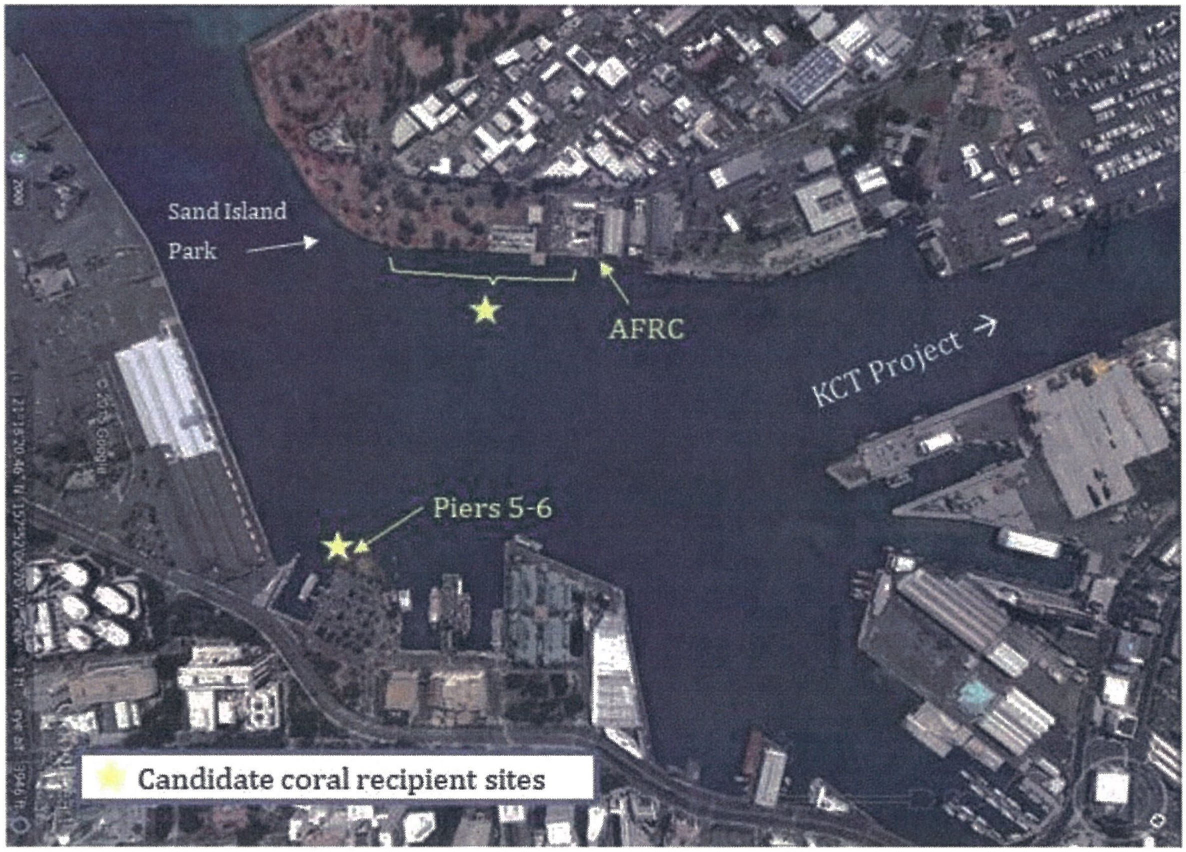

Figure 10. Candidate Coral Recipient Sites in Honolulu Harbor

6.1.3 Support of DLNR-DAR's Coral Stewardship Program

To minimize the long-term loss of 171 sq m of smaller (<40 cm) corals that provide habitat that supports MUS in the harbor associated with the loss of natural substrate (not on piles or sheet piles), DOT-Harbors proposes to provide financial support for the coral reef hatchery at the State of Hawai'i DLNR-DAR Anuenue Fisheries Research Center (AFRC). The amount of funding necessary to minimize the loss would be determined in coordination with DLNR-DAR.

Of the 82,324 corals to be impacted by the project, 82,157 (205 sq m) are <40 cm in diameter and are not likely to be transplanted. Of these, 25,467 (34 sq m) are affixed to man-made substrates, and 56,691 (171 sq m) are affixed to natural substrates (not on piles or sheet piles), and would be lost. DOT-Harbors considered transplantation of the structures with biological assemblages attached and determined the task impracticable due to lack of recipient sites that were climate-appropriate and would not pose a potential hazard for public safety and commercial activity. To minimize the impacts to 56,691 (171 sq m) <40 cm corals from the Project area seafloor (not on piles or sheet-piles), a negotiated amount of financial support would be provided to DLNR/DAR Coral Stewardship Program conducted at the AFRC for coral reproductive and coral restoration research. The coral nursery aims to use professional-level coral husbandry techniques to grow small fragments of a coral colony, recombine them into large colonies, and then transplant them into the field in a fraction of the time it would take these corals to grow naturally. The nursery primarily uses corals for transplantation from harbors. The Coral Restoration Nursery provides coral colonies for multiple restoration projects, which primarily focus on near-shore coral reef resources. Support for this program would minimize long-term losses of <40 cm corals from the Project area by replacing such resources throughout Hawaiʻi.

6.2 APPLICANT'S PROPOSED OFFSET MEASURES FOR UNAVOIDABLE IMPACTS

This section of the report discusses the potential types and quantities of measures to offset adverse effects to EFH. The specific offset measures selected would be further defined through discussion with the USACE and Federal and State Resource Agencies. Offset measures for habitats, water column and MUS are addressed in this section.

6.2.1 Offset Considerations

The EFH coral reef FMP (WPRFMC, 2009a) suggests the following opportunities to offset unavoidable adverse effects that would conserve or enhance EFH to increase yields of MUS by:

- Restoration or enhancement of river, stream, or coastal area watersheds
- Improvements in water quality or quantity to ensure that water quality standards are met, such as:
  - Improved sewage treatment
  - Proper disposal of waste material
  - Maintenance of sufficient in-stream flow to estuaries
- Restoration or creation of habitat

The United States Coral Reef Task Force (USCRTF) was established in 1998 by Presidential Executive Order 13089 to lead U.S. efforts to preserve and protect coral reef ecosystems. USCRTF identified a portfolio of compensatory mitigation and restoration options (Draft Handbook on Coral Reef Impacts) and a list of BMPs that could be implemented to offset adverse impacts on coral reef communities from development projects.

The USCRTF list was reviewed and screened for appropriateness to the anticipated project impacts, ability to successfully implement, and impacts already minimized by project specific BMPs. Offsets proposed for further consideration for this project are listed below.

- Water quality improvements
  - Storm water BMPs
- Coral response and rescue team
  - Movement of at-risk corals from a project area
- Offsite placement of structures to enhance substrate
  - Placement of material that mimics natural coral reef structure
  - Deposition of boulders or other artificial material
  - Placement of artificial reef modules
  - Deposition of coarse dredge spoil
- Nuisance species removal
  - Removal of nuisance or invasive algae species
  - Super sucker removal of invasive algae
- Active coral population enhancement, propagation, and out-planting
  - Land based propagation – aquaria

To offset adverse impacts resulting from the proposed action DOT-Harbors is proposing such measures occur either on-site, within 1-mile of the Project Area or within the same watershed. Offset measures proposed within the harbor are not preferred as the marine environment, by nature, is comparatively degraded as a result of the high commercial activity within and adjacent to the harbor that is compounded by surrounding urban development. Offset opportunities located in nearby areas beyond the influence of the harbor environment are assumed to yield a greater ecological return on investment.

6.2.2 Selected Offset Measures

Based on a review and consideration of the possible offset measures presented in the CREMUS FMP (2009) and identified by the USCRTF, DOT-Harbors determined the following measures are appropriate (reasonable and practicable) to offset for unavoidable adverse impacts to EFH resulting from the Project:

I. **Financial support for the sea urchin hatchery program at the State of Hawaii DLNR-DAR AFRC.**
   To offset for the permanent loss of 305 m. (1,000 ft.) of shoreline and consequential loss of 5,710 sq. m. (1.4 acres) of natural hard substrate EFH, DOT-Harbors proposes to enhance nearby, naturally occurring hard substrate by providing financial support to the sea urchin hatchery at the State of Hawaii DLNR-DAR AFRC. DOT-Harbors would dictate that such financial assistance would be used specifically to fund outplanting urchins to a reef of an equivalent area (1.4 acres) to remove nuisance and

invasive algae and expose natural substrate. A possible candidate site includes the Waikiki MLCD and other sites determined to be appropriate for urchin outplanting that are sufficiently protected to ensure long-term efficacy of the offset. This effort would require program coordination development with others (e.g. DLNR and the private sector). The amount of funding necessary to offset the loss would be determined in coordination with DLNR-DAR.

II. **Financial support for the invasive algae removal program at the State of Hawaii DLNR-DAR AFRC.**
To offset for the short-term loss of the 11,844 sq m (2.9 acres) of biological assemblages associated with the loss of hard substrate, DOT- Harbors proposes to facilitate recruitment of such a biological assemblage to nearby, naturally occurring hard substrate by providing financial support to the State of Hawaii DLNR-DAR invasive algae removal program. DOT- Harbors would dictate that such financial assistance would be used specifically to fund a one-year algae removal project over an equivalent area (2.9 acres) of shallow back-reef areas. A possible candidate site includes the Waikiki MLCD, and other sites determined to be appropriate for urchin outplanting that are sufficiently protected to ensure long-term efficacy of the offset. This effort would require program coordination development by others (e.g. DLNR and the private sector). The amount of funding necessary to offset the loss would be determined in coordination with DLNR-DAR.

6.2.3 Support of DLNR-DAR's sea urchin hatchery (offset for long-term loss of hard substrate)

The key to maintaining low levels of invasive algae is the presence of native herbivores. Therefore, native Hawaiian collector urchins (*Tripneustes gratilla*) are spawned and raised in captivity at the DLNR-DAR's Anuenue Fisheries Research Center. They are propagated as a biological tool to fight invasive alien seaweeds from reef areas throughout Hawaii.

Urchin out-planting works in conjunction with manual removal. Manual removal is an effective means of reducing invasive algae over short periods, but the use of sea urchin biocontrol provides long-term results to control and limit algae re-growth. Invasive seaweed may be removed from the coral reef initially by hand or mechanical means. To ensure the seaweed does not grow back, urchins are introduced to the cleared area to eat any re-growth. A strong population of native herbivores is necessary to counteract the invasive seaweed to ensure success of the removal. Removal of algae from benthic substrate creates available substrate for recruitment and/or coral colonization.

To offset the long-term permanent loss of EFH hard substrate in the Project area (5,710 sq. m., 1.4 acres, associated with the loss of 305 m of shoreline), a negotiated amount of financial support would be provided to DLNR-DAR Sea Urchin Hatchery for urchin reproduction and outplanting efforts over an equivalent area. Support for this program would be balanced with any efforts associated with offsets for the long-term loss of hard substrate.

6.2.4 Support of DLNR-DAR's invasive algae removal program (offset for short-term loss of biological assemblage)

Shallow back-reef areas do not support large quantities of corals, but do support a wide diversity of organisms. The MLCD off Waikiki Aquarium is a suitable site for this action (Figure 11). To offset the short-term loss of the fouling community biological assemblage within the Project area associated with the loss of 2.9 acres of hard substrate, an equivalent area would be financially supported in an established invasive algae removal program. To accomplish this objective, shallow reef areas are suitable.

This reef restoration effort would remove invasive algae from an important shallow reef habitat thereby allowing an increase in diversity as native algae and invertebrates recolonize the reef. Algae removal could be accomplished by sea urchins, which could perform the same function as other removal methods (physical/mechanical). Urchins are produced at the DAR Anuenue Sea Urchin hatchery and can be outplanted at the Waikiki MLCD and/or other sites determined to be appropriate for urchin outplanting.

This measure would support the efforts of researchers to document the subsequent changes to this ecosystem for a one-year period. One or two years including researcher's efforts would span the time anticipated for recovery of fouling community (MUS) in the Project area.

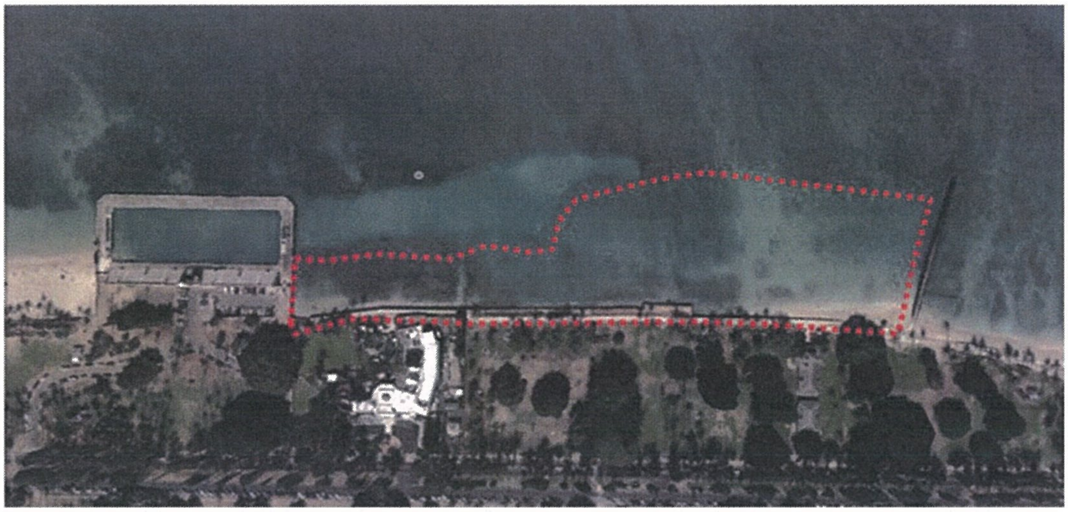

Figure 11 Area Fronting the Waikiki Aquarium suitable for invasive algae removal (offset for short-term loss of biological assemblage).

7.0 DETERMINATION OF EFFECT

The Project would involve discharges of dredged and fill material into waters of the U.S. and permanently converting 2.49 acres of waters of the U.S. to uplands and the discharge of fill material into waters of the U.S. to construct a rock revetment in 0.10 acres of waters of the U.S. (Section 404). The Project would include upland excavation and dredging over 8.13 acres of waters of the U.S. and permanently converting 2.78 acres of uplands to waters of the U.S. (Section 10). Finally, the Project would involve the transport of dredged material for the purpose of ocean disposal at the SOODMDS (Section 103).

Substrate will be permanently lost resulting in a reduction in quantity of EFH. Water quality within the Project Area will be temporarily degraded resulting in a reduction in quality of EFH. The direct adverse effect to EFH from dredge and fill-related loss of substrate is offset partly by introducing alternate soft and hard substrate through construction of the new KCT wharf face. Colonization of the new substrate is expected to take up to one year for the fouling community and up to seven years for corals growing on the new sheet-pile substrate to recover the loss of all corals <40 cm in diameter. The indirect adverse effect to EFH from project related degradation of water quality will be minimized through implementation of appropriate silt-containment BMPs.

Direct beneficial effect to EFH from dredge activities includes removal of accumulated fine sediments that could be resuspended by normal harbor activity (i.e. prop wash) and increasing the resident time in the Project area by increasing depths and water volume. The sealed pile wall construction would indirectly benefit EFH by restricting groundwater infiltration and improving water quality. Installation and implementation of stormwater treatment systems at KCT would indirectly benefit EFH by improving water quality.

The Corps has determined that these activities and their resulting impacts, as described in the preceding sections, would reduce the quantity and quality of EFH, and accordingly would adversely affect EFH for BMUS, CMUS, CREMUS and PMUS within Honolulu Harbor. However, due to the containment of impacts to the Honolulu Harbor, the comparatively low quality of the EFH within the harbor, the size and scale of the impacts in comparison to the seemingly infinite expanse of EFH throughout the Pacific, the expected beneficial offsets resulting from the project design, implementation of temporary and permanent avoidance and minimization measures built into the project and a combination of coral transplantation and proposed offset measures, the Corps has determined that the anticipated adverse effects do not have the potential to cause substantial adverse effects to EFH.

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APPENDIX 2

THE NEW KAPALAMA CONTAINER TERMINAL
WHARF AND DREDGING PROJECT
(H.C. 10498)

DAR Coral Restoration Nursery Kapalama
Man-Made Substrate Coral Project
Statement of Work

Appendix 2

DAR Coral Restoration Nursery Kapalama Man-Made Substrate Coral Project Statement of Work

The State of Hawaii Department of Land and Natural Resources is providing the following draft projections to offset the loss of living Hawaiian coral within the Kapalama project area as provided for under applicable State law and rules.

A. Overview of Issues That Need To Be Addressed for the Kapalama Coral Project:

- The State considers the risk of invasive species (cryptic or endofaunal, associated either directly with the target coral colonies or their base structures) or other contaminant introduction to outweigh any value from transplantation of live coral directly from within Honolulu Harbor to areas outside the harbor.

- The vast majority of the live corals documented within the Kapalama Project area were classified as *Porites lobata*. The State believes that the majority of these corals may be another species that currently is only found within Honolulu Harbor and near the Keehi SBH (closest to the Kalihi Channel Bridge). This unidentified *Porites* species (tentatively titled "Harbor Porites") cannot currently be classified as native or non-native, yet shows characteristics that would make it competitively superior to native corals (asexual planulator, extremely temperature and salinity tolerant, able to withstand broad changes in water quality). As such, we have strong concerns regarding any transplantation (inside or outside of the harbor) of this unidentified *Porites* species. The State proposes substituting non-harbor *Porites* (native *P. lobata* and *P. evermanni*) for the Harbor *Porites;* these replacement corals would be sourced from outside Honolulu Harbor and would be returned to their collection sites after frag and fast growth at the Coral Restoration Nursery in amounts that account for loss of services and functions.

- The Coral Restoration Nursery currently will have capacity to produce up to two hundred twenty (220) 40-cm (longest diameter) coral colonies (each from 10 cm source material) per year. For every 1 meter coral to be produced, this will involve growing four (4) 50-cm (longest diameter) coral colonies (each from 10 cm of source material) for consolidation upon out-planting. Conversion of the current outdoor and indoor available areas at the Coral Restoration Nursery to fast growth facilities is on-going and will result in an increase to one hundred sixty (160) to two hundred twenty (220) 40-cm coral colonies (each from 10 cm source material) per year. This will require replacement of current office and holding tank areas, an additional electrical line, equipment, and staff increases.

- The Coral Restoration Nursery currently has the capacity to hold up to two thousand (2,000) small coral colonies (<40 cm) or one hundred (100) larger corals (> 40 cm) in two of its large acclimation tanks for a period of up to one year with upkeep. Currently we plan to hold Kapalama corals collected from both natural and man-made sources within the KCT Project area; as such, corals may be moved to quarantine and used at any time throughout the four year life of the total Kapalama offset project. Because of concerns about Harbor *Porites*, it is likely we will need to collect coral from outside the KCT Project area to replace *Porites* within the KCT Project area. Under this scenario, source material for out-planting of fast-grown corals will need to also be replaced requiring additional colonies to be produced. We estimate that DAR may need to produce up to 25 additional coral colonies to offset the source corals taken for this project.

B. Determination of Loss and Offset of Loss Using the DAR Coral Tool for Kapalama Corals on Man-Made Structures

Results are presented in terms of the number of coral colonies and the DAR Hawaiian Coral Ecological Characterization Value (ECV):

1. Kapalama Coral on Man-Made Substrate **Loss** Projections (based on AECOS and/or Dollar data)
    a. Corals < 40 cm [Total of 25,468 coral colonies with a ECV of 22,227]
        i. *P. lobata* (?)[1] 6,412 colonies, ECV = 12,452
        iii. *P. varians* 46 colonies, ECV = 21.25
        iv. *Leptastraea spp.* 19,002 colonies, ECV = 9,751.5
        v. *Cyphastraea ocellina* 8 colonies, ECV = 2

    b. Corals > 40 cm [Total of 53 coral colonies with a ECV of 3,230]
        i. *P. lobata* (?)[1] 45 colonies, ECV = 3,150
        iii. *P. varians* 8 colonies, ECV = 80

2. Kapalama Coral on Man-Made Substrate **Offset** Projections Using Source Harbor and Non-Harbor Corals to Fast-Grow Colonies at the Coral Restoration Nursery for Outplanting Outside Honolulu Harbor.
    a. Corals > 40 cm [Total of 43 coral colonies[2] with a ECV of 30,192 needed to offset 25,521 coral colonies impacted with a ECV of 25,457]
        i. *P. compressa* 2 colonies, ECV = 1,280

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[1] Thought by DAR to represent Harbor Porites, a potentially invasive species, not P. lobate as previously identified.

[2] While producing 43 colonies, 8 colonies would be 80+cm long and involve the connection of four (4) 50 cm (longest diameter) genetically-identical colonies together each, resulting in a total of 69 total colonies needing to be produced at the Coral Restoration Nursery in order to offset the loss of 25,521 coral colonies within the KCT Project area. Additionally, sourcing the *P. compressa*, *P. lobate*, *P. evermanni* and *P. duerdeni* would require growing an additional 25 colonies to return to the source sites (i.e. collect 30cm fragments of *P. lobata* and *P. evermanni* on reef to outgrow two 42cm colonies (one from each 10cm fragment of the original 20 cm piece (remainder to be used as back-up replacement material). Total number of colonies to be grown at the Coral Restoration Nursery would therefore be 69 colonies to off-set site + (up to) 25 colonies to original source site = 94 colonies.

>40 cm 2 colonies[3], ECV 1,280

ii. *P. lobata* 7 colonies, ECV = 4,000
   >40 cm 5 colonies, ECV 2,000
   >80 cm 2 colonies[3], ECV 2,000
iii. *P. evermanni* 7 colonies, ECV = 16,000
   >40 cm 5 colonies, ECV 8,000
   >80 cm 2 colonies[3], ECV 8,000
iv. *P. duerdeni* 7 colonies, ECV = 8,000
   >40 cm 5 colonies, ECV 4,000
   >80 cm 2 colonies[3], ECV 4,000
v. *P. varians* 2 colonies, ECV = 40
   >20 cm 2 colonies, ECV 40
vi. *Leptastraea spp.* 14 colonies, ECV = 840
   >20 cm 14 colonies, ECV 840
vii. *Cyphastraea ocellina* 4 colonies, ECV = 32
   >10 cm 4 colonies, ECV 32

C. Budgeting for Efforts to be Conducted:
For all of the Offset Projects involving live coral, budgeting needs to be broken down as follows:

1. Collection Costs – these costs would include the costs to DAR of assessing corals pre-collection for viability and AIS, actual collection and transport of coral colonies to AFRC. It would also include costs of collecting outside *Porites* colonies with the understanding that for each 20 cm of coral collected, two 40 cm colonies would be produced (one for offsetting Kapalama coral and the other to be returned to the site of collection to offset the original collection impact)[4].
2. Quarantine Costs – these costs include costs to DAR to maintain collected corals for fast-growth under quarantine until they are fragged and fast-grown.
3. Holding Costs – these costs cover the cost of just holding Kapalama corals at AFRC until they are transplanted (does not include fast-grown corals). They include necessary re-fitting and re-plumbing costs, utilities, and staffing to care for the corals for a period of up to one year.
4. Expansion Costs – Depending upon the number of corals to be outplanted (fast-grown), expansion of the coral nursery may be necessary to increase fast-growth capacity. Such costs include re-fitting of the existing indoor office area to create a second fast-growth

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[3] 80+ cm colonies are produced from four (4) polygonal-shaped colony modules put together in the field. Each module contains genetically identical coral tissue, allowing for quick fusion once assembled in the field. Each module has a single triangular coral face measuring approximately 50 cm x 30 cm x 60 cm.

[4] Except for where 80+ cm colonies are to be produced; in that case, 30 cm pieces would be collected to be fragmented into 5 10 cm frags, each of which will be grown into a 50 cm module; four of the 50 cm modules will be connected together to form a 80cm+ colony for outplanting and the remaining 42 cm module will be outplanted back into the original collection site.

room and modification of outside areas to provide for additional fast-growth facilities. Increased electrical line, pumps, plumbing would be required. It would also include two office containers and covered deck to replace the indoor office areas to be converted for fast-growth.

5. Fast-Growth Costs – These are the costs to produce a 42cm or 50 cm colony (or other size as listed) from up to 15 cm of source material over an 8 – 10 month period. Includes supplies, equipment, labor, and utilities.
6. Acclimation Costs – Costs for the time and materials required to acclimate the colonies to be out-planted to their out-planting environment (approximately 1 month for each batch of fast-grown colonies to be outplanted).
7. Outplant Costs – Costs to assess out-plant sites, establish baseline, and transport out-plant colonies to the field, prepping the out-plant site, and attaching the colonies to the substrate.
8. Monitoring Costs – monitoring costs include costs for monitoring both transplanted and outplanted corals using the following schedule (mostly done by the DAR AIS Team):
   - Week 1: Monitor 3x (3 monitoring dives including Coral Restoration Nursery staff)
   - Month 1: Monitor 1x/week (3 monitoring dives including Coral Restoration Nursery staff)
   - Months 2 – 6: Monitor 1x/month (5 monitoring dives)
   - Months 7 – 12: Monitor 1x/2 months (3 monitoring dives)
   - Years 2 – 3: Monitor 2x/year (8 monitoring dives)

Most of the monitoring for these projects would be conducted by DAR AIS Team personnel over the time periods listed and would be batched in with their other Kapalama projects.

D. Projected Budget:

1. Coral Restoration Nursery Costs:

Staffing[5]	$440,000		
Travel	$16,000		
Supplies	$60,000		
Equipment	$50,000		
Contractual	$17,000		
Other (incl Utilities)	$158,000		
		Sub	$741,000
Indirect (UH)	$66,000		
Indirect (DAR)	$20,000		

[5] Staffing costs include salary and benefits.

Appendix 2

Total Cost: $827,000

Note that the above costs include expensing of staff time, supplies, facilities and equipment over the initial collection and maintenance of the coral, until it is fragged, fast-grown and outplanted in 2023.

Total Funds to DAR: $827,000

E. Project Timeline

Years 0 (Estimated to be Mar 2019 – Dec 2021; in concert with KCT Project Natural Seafloor Coral Projects):

- Assess HNL Harbor for Collection
- Collect HNL Corals
- Assess Ex-Situ Coral Assessment
- Collect Ex-Situ Coral Collection
- Prep - New Frag Room
- Prep – Quarantine
- Order Trailers, Prep site
- Remove outside round tanks
- Order tanks, raceways, outside pump, sand filter, plumbing, fiber grating
- Hire new positions

Year 1: (Jan 1st, 2022 – Dec 31, 2022)

Q1: Up to 94 modules in frag room

Q2 Conduct baseline assessment of outplant sites

Q3 -----

Q4 Up to 94 modules to outplant (69 total colonies between 20 cm – 1 m to off-set site(s) and up to 25 colonies back to source sites).
Annual Report

Year 2: (Jan 1st, 2023 – Dec 31, 2023)

Q1 Monitoring Dives (3x) Q2
Monitoring Dives (2x)

Appendix 2

Q3	Monitoring Dives (1x)
Q4	Monitoring Dives (1x) Final Report